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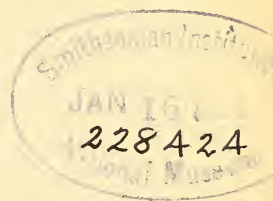
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ERRATA

- Page 14, line 11, for *chryso~~s~~phyllum* read *chrysophyllum*.
 Page 14, line 24, for cillata read ciliata
 Page 15, line 4, for *Splen~~a~~lobus* read *Splenolobus*.
 Page, 28, line 7, for **Cetraria Californica** read CETRARIA CALIFORNICA.
 Page 54, line 7 from bottom for *Syhagnum* read *Sphagnum*.
 Page 54, line 10 for *roesanum* read *Roseanum*.
 Page 54, lines 19 and 20, for *Palaisia* read *Pylaisia*.
 Page 54, wherever Roell occurs read Röhl.
 Page 105, line 4, for *rosus* read *roseus*.
 Page 108, line 1, for *aduncan* read *aduncum*.
 Page 110, line 16 from bottom for *Burbula* read *Barbula*.

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JANUARY 1910



THE BRYOLOGIST

AN ILLUSTRATED BIMONTHLY DEVOTED TO
NORTH AMERICAN MOSSES
HEPATICS AND LICHENS

FOUNDED IN 1898
By
ABEL JOEL GROUT, Ph.D.

EDITOR
ANNIE MORRILL SMITH

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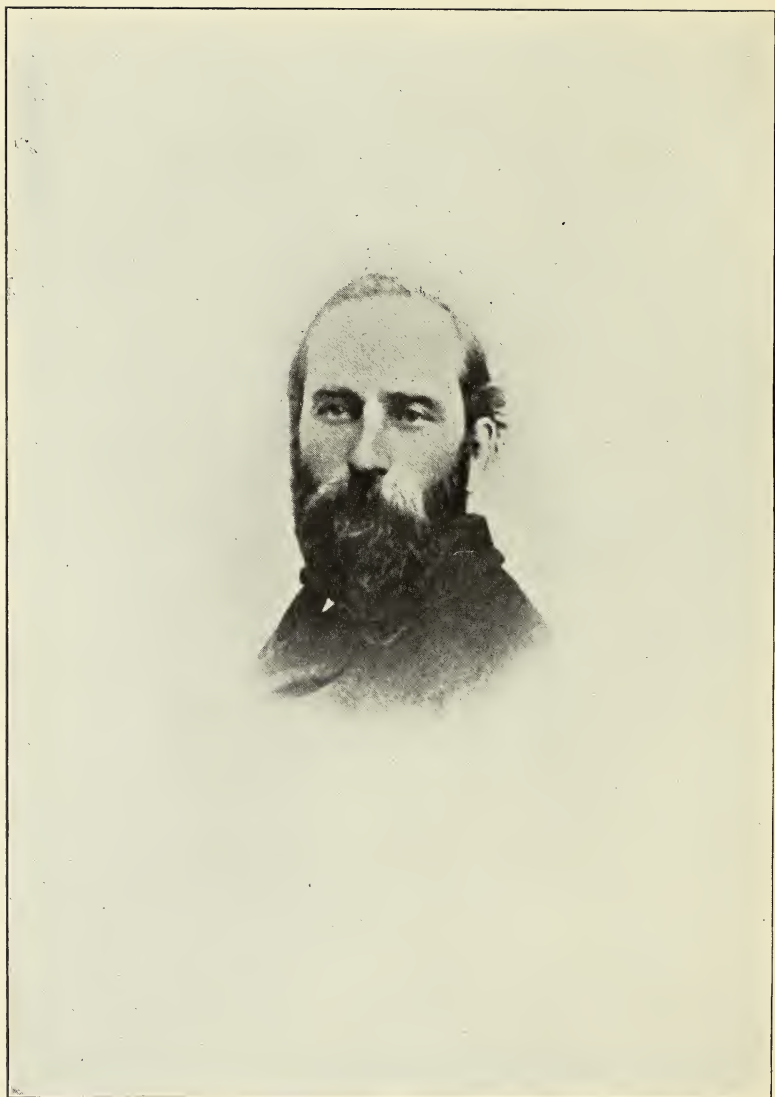
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Weymouth, June 18, 1861

THE BRYOLOGIST

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No. 1

COE FINCH AUSTIN.

1831-1880.

ELIZABETH G. BRITTON.

In the Bulletin of the Torrey Botanical Club for April, 1880, is a brief account by Leo Lesquereux of Coe Finch Austin and as far as we know this is the only attempt to make a record of his work, except a short sketch in Appleton's Cyclopædia of American Biography for 1887. But references to him will be found in every book relating to North American mosses and his contributions to bryology extended over a period of ten years from 1870 to 1880.

He was one of the charter members of the Torrey Club and began his collections with the flowering plants, many of which are still preserved in the state herbarium of New Jersey at Trenton; records of the species will be found in the Bulletin of the Torrey Club, in the list of plants growing within 33 miles of New York City. The first illustration for the Bulletin was made by him. As with the most of his mosses and hepatics his specimens were found in the vicinity of Closter, on the Palisades and in Orange County, New York, though he made occasional trips to the Pine barrens and other parts of New Jersey, and two longer journeys, one to the White Mountains of New Hampshire and one to Florida in March, 1878, with J. Donnell Smith.

One of Austin's earliest contributions was an article in the Proceedings of the Philadelphia Academy of Natural Sciences in 1869, containing 47 species of Hepaticae, and at the time of his death he was the only American authority on this group of plants. In 1870 he issued sets of the Musci Appalachiani, containing 450 numbers, and published a list of the specimens with numbers and localities, of which 27 species and 50 varieties were new and included many forms of *Amblystegium* and *Drepanocladus*. Notable among the new additions are *Leskea* and *Micromitrium Austini*, *Hypnum bergenense*, *H. Closteri* and *H. Novae Caesareae* all from his own region, near his home! He set an example worthy of more followers in keen and painstaking local work. In 1873 appeared his Hepaticae Boreali-Americanae which contained 150 specimens, 30 of which were varieties and 15 species not previously published. For the Centennial Exposition at Philadelphia in 1876, he prepared four large volumes of finely selected specimens, all from

the state of New Jersey, which included 526 mosses, 161 hepatics and 215 lichens. This set subsequently came into the possession of the New York Botanical Garden as a gift from Ellis A. Apgar.

Austin's Herbarium contained many specimens from various parts of North America, as he had many friends and correspondents who sent him material for study and aided him by specimens for comparison; among the most notable of these were Sullivant and Lesquereux, T. P. James, T. C. Porter, Francis Wolle, E. A. Rau, H. W. Ravenell, A. P. Garber, Chas. Mohr, E. Hall, C. H. Peck, John Macoun and many others too numerous to mention.

The Rocky Mountain regions were least known, at that time and with the exception of a few mosses from Colorado, collected by Hall and Brandegee and from New Mexico and Texas by Charles Wright, were poorly represented. The mosses of the Pacific States were just beginning to be studied, and those from California collected by Dr. H. N. Bolander and Leo Lesquereux made known in 1865 by the distribution of the second set of Sullivant's & Lesquereux Musci Boreali-Americanae were well represented in his herbarium, as well as a few new species from Oregon described by Karl Müller, in 1874, and from the Southern States collected by Charles Mohr.

In 1878 Austin issued a Supplement to his Musci Appalachiani including 100 specimens, in which we find the range of localities greatly extended to include Canada to British Columbia, collected by J. Macoun; New Brunswick, Dr. J. Fowler; Virginia, Maryland and Florida, J. D. Smith; South Carolina, Ravenel; Alabama, Mohr, etc. adding 30 new species and many Southern ones in *Bruchia*, *Fissidens*, *Calymperes*, *Syrrophodon*, *Schlotheimia*, *Clasmatodon*, *Cryphaea*, *Fabronia*, *Hookeria*, *Meteorium*, *Neckera*, *Rhizogonium* and *Octoblepharum*. The influence of S. O. Lindberg, whose autograph we find on many specimens sent to him by Austin for naming, was beginning to be felt in the priority of names, notably in *Swartzia* for *Distichium*.

The New England states were poorly represented in his collections and with the exception of a few mosses from the vicinity of Boston, collected by Benjamin D. Greene and T. P. James, and a few from Connecticut by J. A. Allen and some of his own collections from the White Mountains figure very little in his Exsiccatae.

In 1875 Karl Müller dedicated the genus *Austinia* to him for a Cuban species, *A. tenuinervis* (Mitt.), a well deserved honor, for he must always rank among the pioneer Bryologists of North America. In estimating

Austin's work we must not forget it was done before the moss-flora of Europe even, was well known, and that since his death in 1880, all the important works in common use now have been published, including Lesquereux & James' Manual, Braithwaite's British Mosses, Dixon's Handbook, Limpricht's Laubmoose, etc. and that his own library was very small. Of mosses 96 species were described by him and 4 were dedicated to him.

Most of Austin's contributions were published in the Bulletin of the Torrey Botanical Club and a few in the earlier numbers of the Botanical Gazette. He served in the Herbarium of Columbia College as a private assistant, and his collection of mosses were purchased for that institution through the interest of Dr. N. L. Britton in 1887. His hepatics unfortunately, had been previously sold to W. H. Pearson of Manchester, England, where they still remain.

List of Contributions to the Bulletin of the Torrey Botanical Club.

- 1870. *Rubus strigosus* Mchx. 1: 31.
- 1872. New Hepaticae. 3: 9-18.
- 1874. Sandwich Island Hepaticae. 5: 14-18.
- 1874. Some New North American Musci. 5: 21-24.
- 1874. On the Calyptra in the Genus *Archidium*. 5: 30.
- 1875. *Hypnum* (*Rhynchostegium*?) *scitulum* n. sp. 6: 44.
- 1875. New Mosses from Colorado. 6: 45.
- 1876. On two New Musci. 6: 73-75.
- 1876. Notes and criticisms on Hepaticae Americanae Exsiccatae. 6: 85.
- 1876. List of Colorado Musci and Hepaticae, collected by T. S. Brandegee, det. by E. A. Rau, C. F. Austin and T. P. James. 6: 89-90.
- 1877. New Mosses. 6: 142-145.
- 1877. New Hepaticae. 6: 157-158.
- 1877. New Musci. 6: 190-191.
- 1878. Supplement to the Musci Appalachiani. 6: 234.
- 1879. Notes on Hepaticology. 6: 301-306.
- 1879. Bryological Notes. 6: 341-344.

Botanical Gazette.

- 1876. Some New Musci. 1: 28.
- 1876. Notes on Hepaticology. 1: 31.
- 1876. Notes on Hepaticology. 1: 35.
- 1877. Bryological Notes. 2: 80.
- 1877. Bryological Notes. 2: 95.

1877. Bryological Notes. 2: 109.
1877. Notes on Erpodium biseriatum (?). 2: 142.
1878. Notes on Hepaticology. 3: 6.
1878. Bryological Notes. 3: 29.
1878. Polytrichum tenue and P. brachyphyllum. 3: 70.
1879. Some New Musci. 4: 150.
1879. Some New Musci. 4: 161. New York Botanical Garden.
-

DR. RÖLL'S PROPOSALS FOR THE NOMENCLATURE OF SPHAGNUM.

A LE ROY ANDREWS.

A circular of twelve type-written pages distributed by the Secretary of the International Botanical Congress bears the title: "Anträge betr. Aenderungen und Zusätze zu den internationalen Regeln von Wien in Bezug auf die Nomenclatur der Sphagna. Von Dr. Röhl in Darmstadt." The last two pages in French contain a brief résumé of the essential points. The circular is in substance a request that Röhl's style of nomenclature be given, through the sanction of the International Botanical Congress meeting next summer at Brussels, the preference over the more current one of Warnstorf. The suggestions are formulated in proposed supplements or amendments to Articles 12, 37, 41, 43, 48 and 50 of the international botanical rules adopted at Vienna in 1905, these amendments to apply only to Sphagnum. They embrace the following points:

1. The species of Sphagnum are in their nature series of forms, and, this being the case, it is impossible to set up a *forma typica*. Species thus based upon a single form or a herbarium-specimen are of little value, and in cases of doubt the name of the author who has given the diagnosis of a series of forms should be given the preference over that of one who described a species from a single form.

2. The description or diagnosis of a species, *i. e.* of a series of forms, should be short and contain only the characteristic diagnostic characters; it should not repeat the characters of the genus, nor yet those of the varieties and forms.

3. The extension or completion of a description or diagnosis already existant does not justify one in changing the name of the species concerned or that of its author.

4. When within a genus a group is changed in rank or moved into

another group where it retains the same rank, the first author shall be cited, and the author making the changes shall be cited, if at all, in parenthesis, not vice versa as ruled by the Vienna Congress in Art. 43. As examples and explanations under these various heads, with the help of recommendations as *e. g.* that color should not be made the basis for specific or varietal names, and an appendix, in which he asserts among other things that the most of Warnstorf's exotic species are questionably of specific value, Dr. Röhl contrives to insert a good part of his present views upon Sphagnum.

This circular as giving a relatively concise statement of Röhl's point of view in his controversy with Warnstorf may justify a word of explanation and perhaps of criticism. Our present knowledge of the anatomy of Sphagnum dates very largely from Schimper's excellent monograph.¹ To the facts therein set forth there have since been slight additions, notably Russow's studies on the pores and other membrane-gaps of the empty leaf-cells. The anatomical details thus made available have formed the basis of subsequent systematic treatment, having been admirably used by Russow in his papers on the European forms, while Warnstorf aided and supplemented Russow's work on these forms and extended the same methods to a study of the exotic (*i. e.* non-European) species. Röhl published in 1885 and 1886 in Flora his sphagnological system for the European forms,² in which he had already adopted the views expressed in his present recommendations, viz.: that a species is a series of forms (*i. e.* is essentially a generic idea) and that a typical form of a species can not exist. It will be seen at once that the great divergence from the current conception of a species claimed for himself by Dr. Röhl is mostly an imaginary one, and that his "system" is an offence against the accepted principles of binomial nomenclature rather than the dawning of a great light. The obviously fallacious conclusion that Sphagnum is so different from all other genera of the vegetable kingdom, that it must needs have principles of nomenclature all its own rests upon a misconception of the binomial system's typical form. The botanist operating with a type-form does so as I understand the matter for the convenience and accuracy of scientific nomenclature, and not necessarily with the idea imputed to him by Dr. Röhl that all members of the species are exact duplicates of the "typical form." Dr. Röhl's system is simply not binomial, and it is for this reason that it has been so difficult to give it a place in a system that is

1. Published in French. "Mém. p. s. à l'hist. nat. des Sphaignes". Paris, 1857; in German with slight additions as "Versuch einer Entwicklungsgeschichte der Torfmoose," in 1858.

2. "Zur Systematik der Torfmoose."

binomial. The second point suggested by Röhl operates again in the direction of increasing the existing difficulties, viz.: the fact that his descriptions are inadequate. How an incomplete description of a species can be preferable to a complete one is difficult to see, especially as in this case where the descriptions of the component varieties give one often hardly a clue to what they stand for. Under the circumstances it is not surprising that while some of Röhl's new series of forms contained no distinct species at all, others included two or three. Röhl's third point is entirely superfluous, as it is already adequately covered by the Vienna rules, while his fourth point involves merely the unimportant change that the author's name now cited in parenthesis shall exchange places with the one outside, which, if adopted, must of course be accepted for the vegetable kingdom as a whole, not for *Sphagnum* alone.

By what license Dr. Röhl refers to his as the "new" system in sphagnology¹ is difficult to see. It is, viewed in the light of scientific progress, antiquated and reactionary in the extreme. I believe it was Limpricht who referred to that style of sphagnological nomenclature of which it is the extreme representative as "pre-Linnaean". Warnstorf has in his last comprehensive work upon European *Sphagnum*² expressed himself upon the absurdity of naming endless varieties and forms, and it is sincerely to be hoped that he will in his forthcoming monograph upon the genus act upon the courage of his convictions in this respect. There is, be it said, a word of truth in Röhl's contention that a species based upon a single specimen, to which no subsequently found specimen can be referred, is at best a dubious one. This is in principle subscribed to by Warnstorf in his descriptions of exotic species, which he expressly states³ are tentative and may later upon the collection of further material be dissolved into larger specific groups, and we may doubtless expect that Herr Warnstorf will in his monograph himself undertake the necessary revision.

Whatever Dr. Röhl has contributed to our knowledge of *Sphagnum*, and no one will deny that his observations contain such contributions, he may rest assured science will accept with gratitude; it is by no means impossible that it may even employ some of his names, but his system in its entirety it can certainly not make its own. A ruling that the first variety under each of Röhl's new species be considered as its type would settle the vexed question as to the validity of certain of his names, notably *Sphagnum plumulosum*; the alternative is to discard his names altogether as non-binomial, which is the course pursued by practically all recent bryologists except Roth.

Ithaca, New York.

1. Hedwigia 47. pp. 330 ff. 1908.

2. Kryptogamenflora der Mark Brandenburg I. pp. 328, 334.

3. Hedwigia 30, p. 175. 1891.

PRELIMINARY LIST OF HEPATICS COLLECTED IN WORCESTER, MASSACHUSETTS.

HELEN E. GREENWOOD.

The Hepatics listed below have been collected by the writer within the limits of Worcester, Massachusetts, at various times within the last year and a half. Doubtless other species will be found in addition to these.

Certain kinds are found here in abundance, but conditions are not favorable for a great variety of hepatics. There is a great deal of low, wet, swampy land in the outlying territory of the city. The hills of Worcester are full of springs, so that in many localities the roadsides remain very moist throughout the whole season, thus affording just the right conditions for *Blasia*, *Anthoceros*, *Pellia* and *Riccia*.

The acreage of woodland with the accompanying brooks is fast disappearing within the city limits so that favorable situations for such forms as *Jamesoniella*, *Lepidozia*, *Lophozia*, *Nardia*, etc. are rapidly growing less.

Thanks are due to Miss Haynes for her determination and verification of species and for her encouraging words.

1. *Anthoceros laevis* L.

Damp soil by brook side—springy roadsides. Fairly common.

2. *Anthoceros punctatus* L.

Moist roadsides—moist soil in freshly cut banks. Fairly common.

3. *Bazzania trilobata* (L.) S. F. Gray

With mosses in swampy woods on earth. Not common.

4. *Blasia pusilla* L.

Moist roadsides on earth. Almost always with *Anthoceros laevis*.
Common.

5. *Calyptogeia Trichomanis* (L.) Corda

On soil in woods and swamps, and freshly cut banks of roadsides.
Common.

6. *Cephalozia bicuspidata* (L.) Dumort.

Damp soil in woods covering the ground with a thick mat.
Common.

7. *Cephalozia connivens* (Dicks.) Lindb.

Wet swampy soil. Rare.

8. *Cephalozia lunulaefolia* Dumort.

Wet rotten logs and swampy ground. Fairly common.

9. *Cephalozia curvifolia* (Dicks.) Dumort.

On rotten logs.

10. *Cephalozia serriflora* Lindb.
Wet swampy soil, rotten logs. Common.
11. *Chiloscyphus pallescens* Ehrh. Dumort.
On rocks in bed of brook.
12. *Chiloscyphus polyanthus* (L.) Corda
On wet swampy soil with mosses. On rocks in bed of brook—
partly submerged.
13. *Chiloscyphus polyanthus* var. *rivularis* (Schrad.) Nees
On rocks in the bed of a brook, submerged.
14. *Conocephalum conicum* (L.) Dumort.
On shaded banks by roadsides forming a thick mat over soil or rocks,
along brooks.
15. *Frullania Eboracensis* Gottsche
Bark of living trees, white maple, rock maple, walnut, chestnut,
arbor vitae, white birch. Very common.
16. *Geocalyx graveolens* (Schrad.) Nees
Damp soil near edge of brooks, in swamps.
17. *Jamesoniella autumnalis* (DC.) Steph.
With mosses forming a thick mat or layer on damp soil or on rocks.
18. *Liochlaena lanceolata* Nees
Damp shaded banks. Rare.
19. *Lepidozia reptans* (L.) Dumort.
Shaded banks and damp soil in woods with mosses.
20. *Lepidozia sylvatica* Evans
On damp soil and rocks.
21. *Lophocolea heterophylla* (Schrad.) Dumort.
On old stumps, freshly cut soil by roadsides, shaded banks, damp
soil in woods. Very common.
22. *Lophozia incisa* (Schrad.) Dumort.
On damp shaded banks growing with mosses.
23. *Marchantia polymorpha* L.
Damp garden soil, bank wall in city street.
24. *Nardia crenulata* (Sm.) Lindb.
Roadside banks, shaded woods, damp soil, damp springy roadsides.
25. *Notothylas orbicularis* (Schwein.) Sull. Moist soil.
26. *Pallavicinia Lyellii* (Hook.) S. F. Gray
Wet swampy soil forming thick mats. Quite common.

27. *Pellia epiphylla* (L.) Corda
Moist soil along banks of brooks, sometimes submerged, sometimes several feet from the water. Springy roadsides. Very common.
28. *Plagiochila asplenoides* (L.) Dumort.
Very wet soil, rocks in bed of brook, not submerged.
29. *Porella pinnata* L.
On dead wood in brook, submerged.
30. *Porella platyphylla* (L.) Lindb.
Bark of living trees, rocks, damp shaded soil. Very common.
31. *Ptilidium pulcherrimum* (Web.) Hampe
Shaded rocks, base of living trees, damp shaded soil.
32. *Radula complanata* (L.) Dumort.
Trunks of living trees, rocks, soil.
33. *Riccia fluitans* L.
On damp soil. Borders of well-trodden pathways if the soil is damp. Edge of ponds from which the water has receded. Springy roadsides, Quite common.
34. *Ricciocarpus natans* (L.) Corda
Floating on water in ponds. Only found once.
35. *Riccardia multifida* (L.) S. F. Gray
Wet swampy ground with mosses.
36. *Scapania nemorosa* (L.) Dumort.
Shaded banks.

Worcester, Mass.

A CORRECTION BY DR. I. HAGEN.

In the September BRYOLOGIST, page 82, towards the end of the article after the words, Mr. Stuntz quotes: please read as follows:

Hypnum ornithopodioides Scop. Fl. Carn. p. 104 (1760).

Hypnum complanatum L. Sp. Pl. p. 1588 (1763).

Instead of

Hypnum complanatum L. Sp. Pl., ed. 1, p. 1123 (1753).

Hypnum fronde subpinnata ramosa, foliis pellucidis acutis planis Scop.

Fl. Carn., ed. 1, p. 150 (1760).

Hypnum ornithopodioides (nec. L. nec. Huds.) Scop. Fl. Carn., ed. 2, 11, p. 329 (1772). (The last two on the authority of Bridel.)

Dr. Hagen wishes to bring out that there was opposition between the first two and three following names, the words "instead of" by occupying a separate line brings this contrast out.—EDITOR

OBITUARY—L'ABBE CHARLES LACOUTURE.

CAROLINE COVENTRY HAYNES.

L'Abbe Charles Lacouture died on the seventh of November, 1908, at Dijon at the age of seventy-six. He was Professor at the College of St. Clement until it was closed by the German authorities in 1872.

Besides his book on French hepatics giving synoptical pictures and analytical keys, published in 1905, he published in the *Revue Bryologique*, No. 4, 1908: "Cle analytique des Quarrante et quelques sous-genres de l'ancien *Lejeunea* avec figures de chacun d'eux en regard du texte." Monsieur Husnot, in the *Revue Bryologique*, No. 6, 1908, tells of receiving a letter from l'Abbe Lacouture, on the fourth of July, in which he mentions that he has nearly finished another similar work, only three times larger, of pictures and keys of all the known genera of hepatics. It is to be hoped that Monsieur Stephani will at some future time finish and publish this. Though the keys differ from those in general use, the work possesses considerable value to students.

When the writer reviewed his first mentioned book, Monsieur l'Abbe wrote her a most cordial and appreciative letter in acknowledgement, and offered French hepatics. These are to be found in our Society Herbarium, twenty-three French species and a Madagascan set of seventeen species. I need only mention what a pleasure it was to send him the best American species I possessed for he was an enthusiastic worker and will be greatly missed and mourned.

Highlands, New Jersey.

LICHENS OF MOUNT ASCUTNEY, VERMONT.

BY R. HEBER HOWE, JR.

Mount Ascutney, of which there is yet no official government topographic map, is of uncertain altitude so far as I can ascertain, the given elevation figures ranging from 3138 to 3320 feet. It is situated about three miles from the Connecticut river, in Windsor County, Vermont, and though as high, if not higher than Mount Monadnock in New Hampshire, is of a very different type. No distinct timber line exists, in fact the very top is well covered with dwarf spruce, filling with other vegetation the crevices between the ledges. The alpine lichen *Buellia geographica* (L.) Tuck. does not occur, though common on Monadnock.

The lower slopes of the mountain are covered with those singularly beautiful upland pastures so typical of Vermont, and so unlike those

surrounding Monadnock, only forty-five miles to the southeast. The genera *Umbilicaria* and *Stereocaulon*, and other rock-loving forms are therefore poorly represented. An abundance of hard wood covers even the upper slopes, and fills the deep ravines that here and there seam its sides. Only on the uppermost slopes do the conifers predominate.

The mountain is surrounded with spurs and foothill crests and ridges, unlike the cold and almost isolated cone of Monadnock. It is a tradition among the native farmers that the early settlers burned the timber off the upper ledges of Monadnock to destroy a refuge of wolves.

The lichens here listed were collected from August 24 to 26, 1909, about the base of this mountain along Mill brook from Windsor to Dudley's trail, including those secured on one ascent of the mountain on August 25. Of course the list does not claim to be complete, but will serve to show what the general character of the lichen flora is, and for what species not included here, other collectors may search. Very little attention was paid to collecting anything but foliose and fruticose forms.

Examples of all specimens listed are in my herbarium. Duplicates of seven are distributed in *Lichenes Novae Angliae* (Nos. 35, 36, 37, 38, 40, 44, 49). For examination of the specimens representing the genera *Cladonia* and *Stereocaulon* I am indebted to Dr. Lincoln W. Riddle. To Messrs. A. Avery Hallock and Francis J. Bassett I am also indebted for much kind assistance in collecting.

1. *Ramalina calicaris fastigiata* Fr. One fertile meagre specimen, all that was observed, collected on a deciduous tree near the mountain's summit.
2. *Cetraria ciliaris* (Ach.) Tuck. Uncommon, collected in fruit near summit.
3. *Cetraria lacunosa* Ach. Common, collected in fruit on conifers.
4. *Cetraria glauca* (L.) Ach. Rare, collected sterile on twigs. This plant as represented in New England needs much study, being very unlike the typical *glauca* of the Pacific coast. All the eastern plants seem more referable to the variety *fusca* (Flot.) without reference to age or substrata.
5. *Cetraria Oakesiana* Tuck. Common or almost abundant. Collected on all growths and rocks, rarely in fruit.
6. *Cetraria juniperina Pinastri* Ach. Common, collected sterile about 3000 ft. on coniferous twigs, and on rocks.
7. *Evernia furfuracea* (L.) Mann. Not uncommon, collected sterile near the summit.

8. *Evernia furfuracea* *Cladonia* Tuck. Common, collected sterile on conifers above 2800 ft.
9. *Evernia prunastri* (L.) Ach. Rare, collected in a degenerate state on various growths.
10. *Usnea barbata dasyypoga* Fr. Not uncommon, collected sterile on several conifers near the summit.
11. *Alectoria jubata implexa* Fr. Rare, collected sterile on a conifer near summit.
12. *Theloschistes concolor* (Dicks.) Tuck. Not uncommon, collected fertile on trees along roadside.
13. *Theloschistes concolor effuse* Tuck. Rare, collected sterile on roadside tree.
14. *Parmelia perlata* (L.) Ach. Not common, collected sterile on moss and trees.
15. *Parmelia saxatilis sulcata* Nyl. Not uncommon, collected sterile on rocks.
16. *Parmelia physodes* (L.) Ach. Common, collected in fruit on conifers near the summit.
17. *Parmelia olivacea* (L.) Ach. Common, collected fertile on trees on the mountain.
18. *Parmelia caperata* (L.) Ach. Common, collected sterile on conifers at the summit near the altitudinal limit of its range, common in the valleys.
19. *Parmelia centrifuga* (L.) Ach. Common, collected sterile on the ledges at the summit.
20. *Parmelia ambigua* (Wulf.) Ach. Not uncommon, sterile on conifer twigs near the summit.
21. *Parmelia ambigua albescens* Wahl. One example, sterile, growing with species on coniferous twig at summit.
22. *Physcia pulverulenta pityrea* Nyl. One example, sterile on roadside apple-tree in Windsor. I am not at all sure that this variety is not a young condition of Tuckerman's *leucoleiptes*, in which case the latter name should stand as the former is preoccupied.
23. *Pyxine soorediata* Fr. One example, sterile, on the mountain at 1500 ft.
24. *Umbilicaria pustulata papulosa* Tuck. Rather uncommon on the ledges above 2000 feet.
25. *Umbilicaria Dillenii* Tuck. Rare on the summit ledges.
26. *Sticta amplissima* (Scop.) Mass. Not uncommon and fertile, collected at 2000 ft.

27. *Sticta pulmonaria* (L.) Ach. Uncommon and sterile on the base of *Betula lutea* Michx. Collected at 2000 ft.
28. *Nephroma laevigatum parile* Nyl. One fertile example, collected on mountain at 2000 ft.
29. *Peltigera aphthosa* (L.) Hoffm. Not uncommon, sterile, at 2000 ft.
30. *Peltigera canina* (L.) Hoffm. Abundant, fertile, on shaded bank along mill brook.
31. *Leptogium Tremelloides* (L. fil.) Fr. One sterile example collected.
32. *Pertusaria velata* (Turn.) Nyl. One sterile example, collected at 2000 ft.
33. *Stereocaulon paschale conglomeratum* Fr. Two sterile examples, collected on ledges at summit.
34. *Cladonia fimbriata coniocraea* (Floerk.) Wain. Not uncommon, collected on fallen stumps at 2500 ft.
35. *Cladonia gracilis chordalis* (Floerk.) Schaer. Collected fertile in one patch among moss at the summit with the next.
36. *Cladonia gracilis delicerata* (Floerk.). Same as above.
37. *Cladonia cornuta* (L.) Schaer. Collected once sterile on soil at 2000 ft.
38. *Cladonia squamosa* (Scop.) Hoffm. Common, fertile, on soil over rocks, collected at 2000 ft.
39. *Cladonia furcata pinnata* (Floerk.) Wain. Collected fertile once on decayed wood and soil at 2000 ft.
40. *Cladonia rangiferina* (L.), Web. Common, especially in the open pasture lands, collected at 1500 ft.
41. *Cladonia sylvatica* (L.) Hoffm. Common on the lower slopes, collected at 1000 ft.
42. *Cladonia uncialis* (L.) Fr. Common on soil at the summit.
43. *Cladonia bacillaris* Nyl. One poor, fertile specimen was collected at 2000 ft.
44. *Bæomyces Byssoides* (L.) Schaer. Collected fertile in one place by the trail at 2800 ft. on friable granite.

The small number of species listed will show how comparatively meagre a lichen flora this mountain curiously enough supports.

Concord, Mass.

FURTHER NOTES ON VERMONT BRYOPHYTES—V.

A. J. GROUT.

Since my last Notes printed in THE BRYOLOGIST for January, 1907, the following additional facts have been learned.¹

¹Authorities not given are the same as those in "Mosses with Hand-lens and Microscope."
The author is the collector unless otherwise stated.

Mosses New to the State.

DISTICHUM INCLINATUM (Ehrh.) B. & S. Mt. Mansfield. Sterile and a little doubtful.

LESCUREA FRIGIDA Kindb. Mt. Mansfield, Miss Lorenz.

THUIDIUM MINUTULUM. Higbee swamp, Burlington.

AMBLYSTEGIUM FLUVIATILE forma *BREVIFOLIA* Baulay. Pownal. A. LeRoy Andrews.

AMBLYSTEGIUM VARIUM forma *OVATA* Grout (Bry., Nov. 1909) Pownal. A. LeRoy Andrews.

CAMPYLIUM RADICALE (P. B.) Grout (= *Hypnum Bergenense* Aust., *Hypnum chrysophyllum tenellum* of the Manual.). Swamp, Newfane Hill.

Hygrohypnum Closteri (Aust.) Grout new. comb. (= *Amblystegium Holzingeri* R. & C.). Bed of brook, Newfane. A very small species but entirely distinct from anything else American. Given in the May, 1905, Notes as *Hypnum palustre laxum*, but the leaf is 0.7 mm. long, not 7 mm.

HYPNUM CUPRESSIFORME SUBJULACEUM Molendo. Willoughby, Faxon.

PLAGIOTHECIUM PULCHELLUM (Dicks.) B. & S. Moist cliffs, Newfane.

PLAGIOTHECIUM ROSEANUM (Hampe) B. & S. Moist cliffs, Newfane. This and *Thuidium minutulum* were among the doubtful plants in Frost's List. There remain now but two unaccounted for, *Bruchia flexuosa* and *Hypnum demissum*. *Atrichum crispum* being an undoubted error.

Miscellaneous.

ENCALYPTA CILLATA has been collected on limestone ledges in Burlington by C. V. Rand.

DREPANOCLODUS ADUNCUS GRACILESCENS occurs in Manchester.

Faxon's *Drepanocladus revolvens intermedius* from Willoughby proves to be *CRATONEURON COMMUTATUM*.

Frost's *Hypnum palustre* from Brattleboro in his own herbarium is *HYGROHYPNUM EUGYRIUM MACKAYI*. (See Lesquereux and James Manual.).

Cynodontium gracilescens and its varieties from Mt. Mansfield is *CYNODONTIUM TORQUESCENS* (Bruch.) Limpr. according to R. S. Williams.

Hepatics.

Since the printing of my list of additions in *THE BRYOLOGIST* for May, 1905, Dr. Evans has published the following additions to our Vermont flora. For authorities and full particulars see his original articles in *Rhodora*.

Calypogeia Neesiana, *Cephalozia pleniceps*, *Lophozia attenuata*

Lophozia confertifolia, *Lophozia porphyroleuca*, *Metzgeria crassipilis*, *Pellia Fabroniana* (this is the plant I had listed as *Pellia Neesiana* with uncertainty expressed), *Ptilidium pulcherrimum*, *Sphenobolus Hel-lerianus*, *Sphenobolus minutus*. This makes ninety species in all credited to Vermont.

For convenience in consulting, note that I have printed the following Notes on Vermont Mosses since the Supplement to my List of Mosses of Vermont was issued: First in *Rhodora*, September, 1902; second in *THE BRYOLOGIST*, January, 1904; third in *BRYOLOGIST*, May, 1905; fourth in *BRYOLOGIST*, January, 1907.

New Dorp, New York.

REPORT OF THE TREASURER.

The following statement for the year beginning December 1st, 1908, and ending December 1st, 1909, is respectfully submitted:

RECEIPTS.

By cash on hand December 1st, 1908.....	\$ 69.75
By dues from members....	122.25
	<hr/>
	\$192.00

DISBURSEMENTS.

To the BRYOLOGIST	\$ 99 90
To Postage and Secretary's supplies	4.00
Printing Baltimore Post Cards.....	3.50
	<hr/>
	\$107.40
To cash on hand December 1st, 1909.....	84.60
	<hr/>
	\$192.00

ANNIE MORRILL SMITH.

REPORT OF ELECTION.

For officers of the Sullivant Moss Society for 1910:

Whole number of votes cast	18
For President, Prof. Bruce Fink.....	18
For Vice-President, Miss C. C. Haynes.....	18
For Secretary, Mr. N. L. T. Nelson,	18
For Treasurer, Mrs. Annie Morrill Smith.....	18

Respectfully submitted,

EDITH A. WARNER,

Judge of Election.

REPORT OF THE SECRETARY.

The Sullivant Moss Society began the year 1909 with 184 members. During the year 17 members have joined us, 14 have withdrawn, showing a net gain of three, or 187 to start 1910 with.

The herbarium has been increased by various additions during the year, but we hope for a much larger increase the coming year. Mr. Chamberlain has been especially generous with mosses for the herbarium. It would be very much appreciated if members would oftener think of the Society herbarium.

During the two years the present secretary has held the office he has tried with more or less success to get in touch with every member interested in mosses, and thanks are due to many members for help and valuable suggestions.

Of the offerings during the past year, 77 were of mosses. The offerings of liverworts and lichens were about as numerous. The number of moss offerings in 1908 amounted to 50. Of the 27 members who contributed of their store of mosses, five had their offers twice during the year. Three offerings were made by one member and three members, Mrs. Handy, Judge Calkins and Prof. Chamberlain had free offerings five or six times.

The hope expressed in the last report that more members would contribute has been realized and consequently a much larger number of mosses has been offered.

Many members have availed themselves of the generosity of those supplied with duplicates. If every member would try to offer at least one specimen a year as uncommon as possible—the offerings would not have to be confined to the few willing workers who do so much of it. Voluntary offers would relieve the secretary of the necessity of making personal requests for them. This cannot be urged too strongly. No locality can be found that does not contain something of interest to members in other places.

Mr. Chamberlain still conducts the exchange with foreign members. Those desiring the offerings can notify Mr. Chamberlain who will forward them twice a year. It is hoped that many species from other countries will in turn be offered to American members through Mr. Chamberlain.

Personally the secretary would like to see a moss exchange bureau established in connection with the Moss Society. Many members have numerous duplicates—or they can easily get duplicates of mosses common in their locality. They would very substantially increase their own collections by exchanging them for specimens rare or absent in their localities but common elsewhere. This is thrown out as a suggestion in the hope that it may lead to some action later.

N. L. T. NELSON.

Des Moines, Iowa, Dec. 1, 1909.

REPORT OF THE PRESIDENT.

Another successful year has gone into history to the credit of the Sullivan Moss Society. In casting about for the elements which determine the success of the society one will certainly sooner or later "strike the trail" of the editor of *THE BRYOLOGIST*. When one considers the time and energy required to keep on hand articles of a suitable kind, to edit and read them in proof, to see that the things of the society and the journal are done when they should be, the work of the editor assumes most important proportions. I doubt whether we realize just how much she has done for us. When we enjoy the good things of a successful year let us remember to give credit to her to whom it is so largely belongs.

T. C. FRYE,

Seattle, Wash.

REPORT OF THE LICHEN DEPARTMENT.

The Herbarium of the Lichen Department contains at present 871 specimens, representing 57 genera and 357 species and varieties; 277 specimens have been added during the year, 71 being new to the Herbarium. A valuable set of 65 rare lichens, collected in Minnesota, Iowa, and British Columbia, were donated by Prof. Fink. Mrs. Harris contributed about 80 specimens from Mt. Meenahga and Fisher's Island, New York, and from Minnesota. Prof. Bonser sent in many from Washington and Oregon; Mr. Nelson from the Rocky Mountains, and many others contributed smaller sets from various localities in Canada, British Columbia, and the United States—the Southern States are but poorly represented, however. Dr. Brenckle presented a number of named duplicates, which, with duplicates from other sources, are being used for purposes of exchange, and also in making up sets to assist beginners in their studies. The only foreign contribution this year was from Mr. E. Jishiba of Sendai, who sent 36 fine specimens from Japan. Many of the specimens received have not yet been placed in the Herbarium. I have been most kindly assisted in determining the cladonias and the crustose lichens by Prof. Fink and Mr. Merrill.

I hope that all members, both native and foreign, who are interested in lichens, will remember the Lichen Herbarium during the coming year: specimens, common or rare, named or unnamed—all will be acceptable, and will be used to further the best interests of the Society.

A duplicate list of specimens in the Lichen Herbarium, and the specimens themselves, can always be borrowed by the members.

MARY F. MILLER, Custodian.

REPORT OF CUSTODIAN OF HEPATIC DEPARTMENT.

Since assuming charge of the Herbarium two hundred and thirty-two specimens have been added which bring the total number of specimens to one thousand, nine hundred and seven. Gifts to the Herbarium have numbered during the year to more than three hundred specimens.

One hundred and sixty duplicates have been distributed and there are many more to be given to those interested enough to make their wants known to the Custodian, or better still, are willing to exchange specimens from their own locality for the Herbarium material. Even the more common hepatics could be used to advantage in making up sets for the beginners. Good fruiting specimens are always in demand, and can often be collected in quantity if the members would keep the need of the Herbarium in mind. We should make the Herbarium more fully represent the Hepatic flora of the country.

It is a pleasure to make especial mention of the gifts received from Mr. A. S. Foster of the State of Washington, Mr. D. L. Dutton of Vermont, Prof. John L. Sheldon of West Virginia, and E. Jishiba of Sendai, Japan, all of whom have sent large numbers of specimens.

Miss Helen E. Greenwood, Mr. H. Dautun, Prof. Krout, Mr. C. C. Kingman, Miss Wheeler, Prof. Collins, and Prof. W. H. Chamberlain have sent contributions during the year; Miss Caroline Coventry Haynes has given the two decades of the third issue of her *American Hepaticae*, Nos. 40 to 60, which have been placed in the Herbarium. She wishes me to state that through the generosity of Dr. V. F. Brotherus, Dr. Hagen and Mr. Rapp, offerings are being distributed by her as fast as possible. The November offering was eagerly taken up, fully thirty-one sets being sent out which is fully ten above the average. The subsequent issues will be equally interesting. Mrs. Josephine D. Lowe contributed during the year a specimen new to North America, of *Microlejeunea ulicina* (Tayl.) Evans, collected by her in Nova Scotia.

The Custodian has in preparation for the Herbarium, a set of forty specimens from Superior, Duluth, Lake Superior district. Mr. E. Jishiba of Sendai, Japan, has sent to the Herbarium an interesting collection of twenty-three species from Japan which is in the process of determination.

While relinquishing the care of the Herbarium, for the time being, Miss Haynes continues to give most generously of her time and knowledge to the determination of difficult species; indeed, the kind help and encouragement of Miss Haynes and Dr. Evans to me has been equal to any discouragement that has arisen and I thank all the members who have used this department, for any courtesy they have shown at delays and mistakes incident to a change of custodians.

GEORGE H. CONKLIN,
Superior, Wis.

OFFERINGS FOR JANUARY 1910.

(To Society Members only. — For postage.)

- Mr. A. S. Foster, Goldendale, Wash. *Fontinalis antipyretica* L.; *Fontinalis Kindbergii* R. & C.; *Conomitrium Julianum* Mont.; *Sticta crocata* (L.) and *Sticta scrobiculata* (Scop.) Ach. All collected in Washington.
- Miss E. W. Rondthaler, Moravian Seminary, Bethlehem, Pa. *Webera sessilis* Lindb. = *Diphyscium foliosum* Mohr. Collected in Pennsylvania.
- Dr. John L. Sheldon, West Virginia University, Morgantown, West Virginia. *Sphagnum palustre* L. = *S. cymbifolium* Ehrh. Collected in West Virginia.
- Supt. H. C. Sanborn, 11 Winthrop Street, Danvers, Mass. *Dicranella rufescens* Schimp., and *Hypnum Haldanianum* Grev. Collected in Mass.
- Dr. A. F. K. Krout, Glenolden, Delaware Co., Pa. *Leucolejeunea clypeata* (Schw.) Evans, and *Porella pinnata* L. Both from Delaware.
- Mr. J. Warren Huntington, Amesbury, Mass. *Fissidens subbasilaris* Hedw. Collected in Mass.
- Miss M. Edna Chessington, 96 Gordon Ave., Hyde Park, Mass. *Hylocomium proliferum* Lindb., and *Trematodon ambiguus* Hornsch.
- Dr. J. F. Breckle, Kulm, North Dakota. *Lecanora muralis saxicola* Schaer.; *Lecanora cinerea* (L.) Sommerf.; *Placodium elegans* (Link) DC., and *Rinodina oreina* (Ach.) Mass.
- Dr. George H. Conklin, 1204 Tower Ave., Superior, Wisconsin. *Blepharostoma trichophyllum* Dum. Collected Lake Superior District, and *Pallavicinia Lyllii* (Hook.) Fuern. Collected by Mr. E. B. Chamberlain in Maine.
- Rev. H. Dupret, Seminary of Philosophy, Montreal, Canada. *Hypnum molluscum* Huds., and *Eurhynchium circinatum* B. & S. Collected by H. Dupret in Southern France (U. S. postage accepted).
- Mr. George B. Kaiser, 524 Locust Avenue, Germantown, Pa. *Eurhynchium serrulatum* (Hedw.) Kindb. Collected in Delaware.
- Mr. George M. Pendleton, Sisson, California. *Parmelia physodes* var. *enteromorpha* (Ach.) Tuckerm., and *Cladonia macilanta* Hoffm. Collected in California.
- Mr. N. L. T. Nelson, Des Moines College, Des Moines, Iowa. *Cylindrothecium seductrix* (Hedw.) Sulliv. Also *Mnium punctatum elatum* Sch. Collected by Mr. W. R. Maxon.
- Mr. Edward B. Chamberlain, 38 West 59th Street, New York City. *Dicranella clathrata* Hook. f. and Wils. Collected by Mr. W. Gray in New Zealand. *Bryum Duvalii* Voit and *Dicranum spurium* Hedw. Collected in Finland by Dr. V. F. Brotherus.

SULLIVANT MOSS SOCIETY MEMBERS.

* Star indicates Charter Members.

1. Adams, Miss Carrie E. R. F. D. 1, Hinsdale, New Hampshire.
2. Adams, Mr. F. M. Box 515, Sharon, Mass.
3. Ames, Mr. Oakes. Ames Botanical Laboratory, North Easton, Mass.
4. Anderson, Mr. John A. 20 Arlington St., Dubuque, Iowa.
5. Andrews, Dr. A. LeRoy. 508 University Ave., Ithaca, New York.
6. Badé, Wm. Frederic, Ph.D. 2223 Atherton Street, Berkeley, California.
7. Bailey, Dr. John W. 4541 Fourteenth Ave., N. E., Seattle, Wash.
8. Banker, Howard J., Ph.D. DePauw University, Greencastle, Indiana.
9. Barker, Wm. Torrey. 83 Forest Hills Street, Jamaica Plain, Mass.
10. Barnes, Prof. Charles R. Dept. Botany, Univ. of Chicago, Chicago, Illinois.
11. Basset, Mr. Francis Jackson. 20 Ashland Street, Taunton, Mass.
12. Beattie, Mr. Frederick S. Tilton, N. H.
13. Best, Dr. George N. Rosemont, New Jersey.
14. Bethel, Mr. E. 270 South Marion Street, Denver, Colorado.
15. Bonser, Prof. Thomas A. Spokane College, Spokane, Wash.
16. Borden, Miss Lydia Prichett. Manoa, Delaware Co., Pa.
17. Brenckle, Dr. J. F. Kulm, North Dakota.
18. Brinkman, Mr. A. Box 66, Stettler, Alberta, Canada.
19. Bristol, Prof. W. E. Syrian Protestant College, Beirut, Syria.
22. *Britton, Mrs. Elizabeth G. New York Botanical Garden, Bronx Park, New York.
21. Brotherus, Dr. V. F. Helsingfors, Finland, Sweden.
22. Browne, Mrs. A. F. Sandy Cove, Digby Co., Nova Scotia.
23. Browne, Mr. Arthur S. Brunswick School, Greenwich, Connecticut.
24. Browne, Miss Carlotta H. 871 North 41st Street, Philadelphia, Pa.
25. Bryant, Miss Elizabeth B. 1200 Commonwealth Ave., Allston, Mass.
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THE BRYOLOGIST

AN ILLUSTRATED BIMONTHLY DEVOTED TO
NORTH AMERICAN MOSSES
HEPATICAS AND LICHENS

FOUNDED IN 1898

By

ABEL JOEL GROUT, Ph.D.

EDITOR

ANNIE MORRILL SMITH

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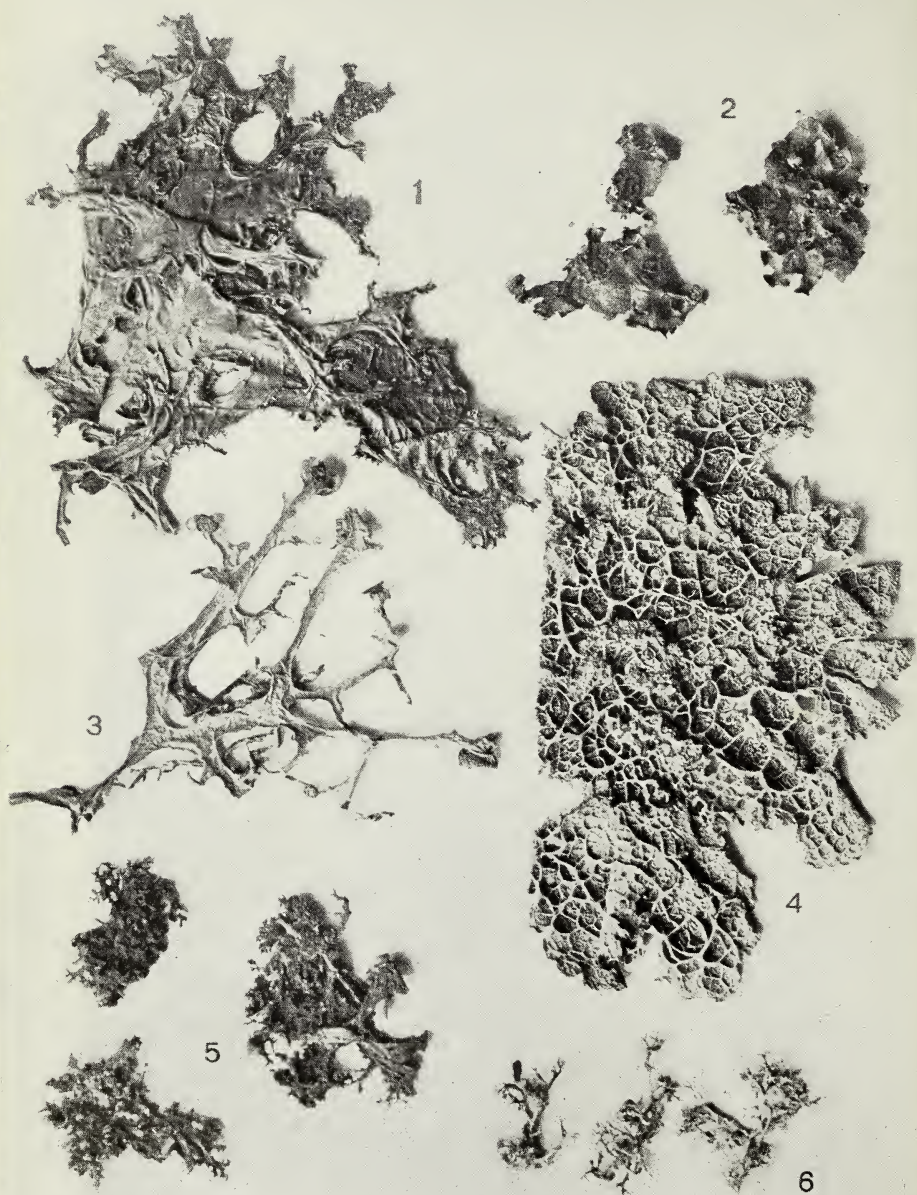


PLATE II. *Cetraria* forms.

LICHEN NOTES No. 14.

Two New *Cetraria* Forms and Three New Combinations.

G. K. MERRILL.

1. *Cetraria Oakesiana* var. *spinulosa* Merrill, var. nov.

Thallus moderately spreading, sub-decumbent but the fertile lobes commonly ascendent, greenish or glaucous, cartilaginous, often rigid lacinate-lobate, the lobes variable in length, rather plane, borders sinuous, undulate, sometimes crisped; above slightly uneven or rugulose, sub-shining, marginally beset with scattered or abundant very short or sometimes moderately elongated dentate spinules, or some of the lobes sorediate in the manner of the species; within white; below whitish-fuscescent or brownish, sub-shining or opaque, here and there rugulose, with coarse fuscous rhizinae conspicuously developed at the point of contact with the substratum. Apothecia rather infra-marginal, concave at first with a rather thickened rugulose incurved margin, finally more or less explanate, the margin continuing as in the juvenile states or even with the disk, epithecium chestnut, shining, the back of the receptacle rugulose. Spores simple, globose or sub-ellipsoid, in eights, $5-6\mu$, spermatia cylindrical, straight, very slightly thickened at one end, spermatogones situated in the swollen tips of the spinules.

On twigs of *Kalmia latifolia* and *Picea rubra*, "Cranberry Glades," Pocahontas County, W. Virginia. J. L. Sheldon, Aug. 5 and 7, 1909. Plate II. Fig. 2.

The present is unmistakably near to *C. Laureri* Kremppl. Flora (1851) p. 673. *Platysma complicatum* Nyl. Syn. (1860) p. 303. The apothecia are affixed at the tips of the plane linear lobes in the same manner, and the margins of the lobes are likewise spinulose. The description of *C. Oakesiana* in Tuckerman's 1848 Synopsis p. 17, mentions that the species may have "black-ciliate (or more commonly pulverulent)" margins. Whether this means that the author was acquainted with the form here described is not known. I have examined no specimens of *C. Oakesiana* provided with cilia, and the v. *spinulosa* is dentate-spinulose, not ciliate. In the 1882 Synopsis Tuckerman omits mention of ciliate conditions of *C. Oakesiana*, and he disclaims having found spermatia.

2. **Cetraria hiascens** (Fr.) Th. Fr. Lich. Scand. p. 98, var. **macrophylla** Merrill, var. nov.

Thallus growing in tufts, erect or sub-decumbent, pallid-fuscescent brown or even nigricant at the tips but paler basally, rigid but brittle, the lobes variable in width, attaining to a maximum of 16 mm. and a height of 7 cent. the margins dividing into relatively short irregularly outlined lacinulae, both major and minor axils rounded, lobes commonly plane but variously contorted, only the tips canaliculate; the superior surface smooth, irregularly lacunose, the lacunae shallow, or here and there ribbed, scarcely differing below except in remaining pale with scattered white soredia, cortex continuous, sub-shining, the borders of the lobes laciniolate-spinulose. Apothecia not seen.

On the earth with mosses and other lichen species. St. Paul's Is. Behring Sea, J. M. Macoun, June, 1897. Plate II. Fig. 1.

A remarkable form analogous to the v. *robusta* Ach. of *C. Islandica*. Only the possession by the writer of an exceptionally informative series of *C. hiascens* serves to ally the present with the attenuated and multifid examples of the White Mountains of New England. The colder regions of the earth seem to be the natural homes of the explanate forms of *Islandica* stock, for there is marked tendency in specimens of *C. hiascens* from Anticosti Island and Hudson Bay toward lateral expansion. *C. hiascens* from the White Mountains affords two rather distinct forms, one of which, a rather carious and strongly albo-sorediate condition was saluted by one American lichenist as *Cladonia degenerans*. The second of these, commonly very slender, less sorediate and usually espinulose, has been called *Cladonia furcata spadicea*, *Evernia furfuracea* and by other appellations. The close affinity that the younger Fries reckons for *C. hiascens* with *C. Islandica* is in my opinion rather a parallelism, no more to be regarded than is the marked similarity of certain conditions of *C. Islandica* with variant states of *C. cucullata*. The caespitose densely-compacted habit of the more slender states of *C. hiascens* is entirely absent in the var. *macrophylla*.

3. **Cetraria lacunosa** Ach. forma **cavernosa** (Menzies) Merrill, comb. nov.

Thallus cartilaginous, rigid in old specimens, lobes less ascendent than in the species, reticulate-lacunose-cellulose, the septum dividing the lacunae conspicuous and very thin; the superior surface whitish, whitish-cinereous or glaucescent, opaque; beneath whitish at the circumference, centrally brown or blackish, or the whole surface variegated, commonly opaque, but sometimes shining, when as it now and then happens that the plant is corticated. Apothecia as in the species but not so commonly perforate.

On limbs of alders, Cathlamet, Wash., A. S. Foster, no. 501; and Comox, Vancouver Is. Macoun's Canadian Lichens, no. 25. Plate II. Fig. 4.

The f. *cavernosa* differs chiefly from the species in color and in the depth attained by the cellular lacunae. While the species is also found on the west coast, I have examined no gradal conditions between it and the forma. Mr. A. S. Foster to whom I am indebted for very beautiful specimens of the latter informs me that it is of rather uncommon occurrence, although when discovered there are usually several plants found together.

There are certain membranaceous round or irregularly-round lobed conditions of *C. lacunosa* occasionally found that approach so nearly to variant examples of *C. glauca* as to be often confounded with that species. In the first mentioned the commonly brown and shining under surface is found to be faintly *rugose-pustulate*. The *C. glauca* form likewise brown and shining is differentiated by its *rugulose-reticulate* inferior surface. The upper surface in both forms is distinctly lacunose-reticulate. In freshly gathered specimens it is easy to discriminate between the two for the *C. glauca* form has the distinct green coloration characteristic of the species, but in herbarium specimens where the color has changed, only attention to the characters below may serve to separate.

4. *Cetraria stenophylla* (Tuck.) Merrill, comb. nov.

C. lacunosa b. *stenophylla* Tuck. Synopsis p. 35.

That this plant has any nearer relationship with *C. lacunosa* than *C. glauca* is open to question. All of the many gradal conditions of the species that I have examined afford evidence rather of an affinity to the latter through its var. b. *stenophylla* Tuck. Agreeing with *C. lacunosa* in coloration and in tendency to fertility, *C. stenophylla* is like the narrowed *C. glauca* form in mode of ramification and the more important particular of habit. No difficulty is experienced in tracing the origination of *C. glauca stenophylla*, for narrowed (*stenophylline*) states of the laciniae are sometimes observed as accompaniments of the typical broader ones, in a single individual. In no instance however have I observed any tendency of undoubted *C. lacunosa* to divide into narrowed linear lobes in the manner of the present. Transition states are not wanting between *C. stenophylla* and the *C. glauca* form, indeed it is at times difficult to say whether a specimen be one or the other. The principal points of difference between the two may be summarized as follows. The margins of the laciniae in *C. stenophylla* are commonly continuous and rather smooth, while in the *C. glauca* form they are broken, dissected and at times coralloid. *C. steno-*

phylla is often found with apothecia but the other is seldom seen fertile. The superior surface of both plants is more or less reticulated, opaque and sub-shining. Below *C. glauca stenophylla* is commonly corticated brown and shining, while *stenophylla* is usually white, decorticate and opaque, or sub-shining. These characters are very inconstant however. Plate II. Fig. 3.

5. *Cetraria Californica* Tuck. Suppl. 1859. p. 203.

Plate II. Fig. 5.

The discrepancy between the original description of this plant and the published examples, long ago attracted my notice. Tuckerman's description converted into English reads: Thallus caespitose, cartilaginous, lacunose-subcanaliculate, opaque, greenish-fuscescent, irregularly sub-dichotomously branched, the branches patent, fertile branches thickened above; apothecia terminal, appendiculate, margins dentate-fimbriate at length convex, black. The author further remarks of its habit; "fronds in small roundish masses, many branches diverging from a single base, with the aspect of a small slender state of *Ramalina calicaris* b. than of the erect *Cetraria* to which, and in particular *C. trista* and *C. aculeata*, it is indeed, if I mistake not, nearest allied." Tuckerman's diagnosis of the form in his Synopsis p. 29, differs only in a slight amplification. He states that the plant is 'fruticulose, sub-fistulose, compressed-terete, at length deeply canaliculate lacunose'—"the disk dark green, becoming black and excluding the toothed margin." The term compressed-terete is scarcely applicable to any condition shown in my copies of the following exsiccati: Kryptogamae exsiccati (Zahlbruckner) no. 1047; Lichenes Boreali Am. (Cummings) no. 142; Decades No. Am. Lichens (Cummings) no. 212; and two copies of no. 192 of Dr. Hasse's distribution. There is furthermore a marked divergence in color and mode of branching in the examples cited from Tuckerman's description. In 1908 Mr. A. S. Foster favored me with a copious collection of a plant that after considerable study I pronounced to be *Cetraria Californica* of Tuckerman's Synopsis. The material answered in every way to the description except that the margins of the apothecia were almost uniformly smooth rather than dentate-fimbriate or toothed. Examination of the material made more emphatic the differences apparent between specimens of the exsiccati cited and Tuckerman's description. A recent lot of lichens from Mr. Foster contained a peculiar dark almost black *Cetraria*-like form reminding one of *C. sepincola* that I eventually considered equivalent to that form of *C. Californica* repre-

sented in the exsiccati mentioned. The specimens were sufficiently variant from the published plants however to reawaken interest in the whole series, and to engender some doubt of the correctness of my reference of Mr. Foster's first material to *C. Californica*. In order to determine if one or both of the forms here discussed, or if only one, which one might rightfully be called *Cetraria Californica* Tuck. typical specimens of each were submitted to Dr. W. G. Farlow, of Harvard University, for comparison with Tuckerman's original material. In response, Dr. Farlow writes: "the *Cetraria Californica* of Miss Cummings" (and this includes the Hasse and Zahlbruckner specimens) is what is called in Herb. Tuckerman var. *sepincola*. That on *Pinus contorta*" (the terete-compressed form of Mr. Foster's first collection) "is really *C. Californica* of Herb. Tuckerman," and I will add of his description. During my early examination of Mr. Foster's first collection of *C. Californica* vera according to Dr. Farlow's letter, the striking resemblance of the plants to *Alectoria Oregana* Tuck. furnished a matter for consideration. This similarity is noted in the often costate-channelled main stems of both and the similar manner in which the apothecia are borne. The apothecia of the form Tuckerman designates as his species as examined in numerous specimens are typically *lateral* and affixed in much the manner of *Ramalina* (*Alectoria*) *gracilis* Nyl. and appendiculate when only one occurs on a stem, or the uppermost when more than one is found. So dubious seemed any reference of the form to *Cetraria* as it has been studied of late, that an effort was made to allocate it with some of the published *Alectoria* species. *Alectoria cetrariza* Nyl. Lich. Freti Behringii p. 76, collected in Oregon on *Pinus contorta* seemed from its description to agree very well with our plant, and as the cotype of the species presumably reposed in an American herbarium, confirmation of the suspected equivalency appeared to be within reach. Dr. J. W. Eckfeldt from whose hand Nylander received *Alectoria cetrariza* kindly compared specimens of *Cetraria Californica* vera with his cotype, and pronounced them alike. Arguing that Nylander's view of the generic affinity of the species is correct and that is my belief, a new combination becomes necessary for its designation. It is proposed to salute the species as ***Alectoria Californica*** (Tuck. Merrill comb. nov. Plate II. Fig. 6.

With reference to what Tuckerman designated in herbarium as the var. *sepincola* of *Cetraria Californica*, there is no reason to believe that it is in any way related with *Alectoria Californica* as here constituted, either by descent or affinity, and certainly not anatomically. The thallus

of the former is typically foliaceous, dorsiventral in structure, and the apothecia are affixed to the surface or near the margin of the lobes and provided with a dentate excipular margin. In *Alectoria Californica* the thallus is cylindrical, radial in structure, the apothecia lateral with a commonly entire and smooth margin. In the view here taken of the species *Cetraria Californica* Tuck. is as yet undescribed and only represented in any mode of publication by such examples as have been issued by Miss Cummings and Dr. Zahlbruckner. The sub-nomen *sepincola* may well be dropped.

Rockland, Maine.

A PLEA FOR MORE AND BETTER LOCAL WORK.

ELIZABETH G. BRITTON.

Read by title at the meeting of the Sullivant Moss Society, Boston, Dec. 30, 1909.

This is not meant to disparage any of the work on mosses that has been done in America or that is now being done by various students in different states; but is rather the natural desire of one who day after day, and year after year, is shut up in the house with the mosses, after they are torn from their natural surroundings, all breath of the woodlands gone, and many times all records as to seasons, habitat, date, place, conditions, etc. Sometimes even the name of the collector gone as well. It is from nearly thirty years of study and experience that I say, that no group of flowering plants will better repay ecological and biological study than the mosses.

The most common species are often the ones least understood, or if they have been understood, their records are lost, and only a list of synonyms, sometimes a page in length (See Paris Index p. 339-340, vol. I, second edition,) as in *Ceratodon purpureus*, remains to show the struggles of systematists to account for its variations and the imperfections of our text-books in description. You know what Braithwaite says about this species?

"The polymorphous character of this plant may be assumed from its lengthy synonymy, and so endless are the forms that we cannot even define stable varieties. We would advise all commencing bryologists to study every part of this moss well, as its structure once familiarized to the eye will save much after trouble, and the beautiful peristome must attract every microscopist."

Ditrichum tortile (Schrad.) Boeck. is another puzzle (See Paris Index 2: 93) and even at the present time American students are not agreed as to whether we have one species or four, in our collections, bearing this name.

Paris Index shows half a page of synonymy for this species, beginning in 1791, and a critical study of Kindberg's and Limpricht's descriptions of this and other species of the genus *Ditrichum* will show you that confusion still exists, which can only be solved by more and better field study!

The same is true of many other common and variable mosses, such as *Fissidens adiantoides*, *Funaria hygrometrica*, *Physcomitrium turbinatum*, etc. so that any one desiring a chance to experiment need only gather any one of these species, bring them into the house, put them in a covered glass dish, watch them, and keep notes. It is desirable, however, to find out first what you have before any changes take place, because a curious thing happened a few years ago in the laboratory of the New York Botanical Gardens. Dr. Richards and Dr. MacDougal were conducting some physiological experiments in testing the influence of illuminating and other gases upon plants.¹

Some species of mosses were found to be particularly resistant to the influence of Carbon monoxide, and lived and grew in an atmosphere that was sufficient to kill any other plants! But the singular thing that happened was that in a species of *Bryum* the stems grew very tall and slender, the leaves were depauperate and produced in their axils, an abundance of propagating bodies exactly like those of *Pohlia prolifera*; yet as far as we know this species does not occur wild within the limits of the garden, and this peculiar condition may have been due as much to the excess of moisture and close confinement as to the illuminating gas. What the species was before it took on this unusual habit of propagation no one knows, and the leaves were too poorly developed to tell. The plant simply could not achieve its usual reproduction so it accomplished an abnormal propagation.

Now this sort of thing, and others just as interesting, occur continually in nature, with the result that we get new specific and varietal names *ad nauseam*, without any explanations of the conditions. Mr. Williams, who has had a large and varied experience as a student and collector, tells me that in Montana near Great Falls, where he collected mosses for seven years, it frequently happened that a moss would fruit well and abundantly one year, and then not occur again in good condition for two or three years. We know this is true of the paper-white narcissus. Some years it flowers profusely, last spring for example was a wonderful year for bulbs of all kinds, but other years, either due to late frosts, or a dry season, the flowers will be blasted.

1. Richards and McDougal, The Influences of Carbon monoxide and other Gases upon Plants. Bull. Torr. Bot. Club 31: 57, 66 and 167. 1904.

Now this is true of the capsules of mosses. In fact the fecundation of the archegonium and the development of the peristome are entirely dependent on moisture, and if a long dry season occurs before either is accomplished, sterility or abortion takes place.

Now to return to *Ceratodon purpureus*. Those of us who have watched, as I have in the New York Botanical Gardens, know that a long dry summer and fall, such as we have had this year, with snow or rain coming after the nights are cold, will make a difference in the fruiting of this species. None of the lovely wine-red pedicels which give this species its specific name of *purpureus* have thrust up in the hollows of the rocks this year, and in February and March when growth begins again the antheridia and archegonia will probably be too old and dry to do their work.

Two adjectives occur frequently in the vocabulary of a professional bryologist, they are "*old and worn*." No one who has not tried to write a satisfactory description from dried plants and gone over all the material available both from America and Europe realizes the difficulty of finding specimens in good condition. In some genera such as *Orthotrichum*, for instance, it is imperative that the *peristome* be in just the right state in order to see the *cilia*. If it is too old they are gone. In other genera like *Grimmia*, it is the *calyptra* or the *annulus*, and we all know that these frequently fall with the lid.

So when "*A Plea for More and Better Local Work*" reaches those whose time and place allow it, I want them to realize that even the commonest species are full of interest and problems unsolved, and that the dreary round of study from dry materials may be greatly helped by a refreshing series of observations from living plants.

New York Botanical Gardens.

AMBLYSTEGIUM HOLZINGERI—A CORRECTION.

A. J. GROUT.

In the November, 1909, BRYOLOGIST I published *Amblystegium Holzingeri* as a new species. Prof. Holzinger called my attention to the fact that this combination had already been used by Renault and Cardot for *Hypnum Closteri* Austin of which it of course becomes a synonym, as Austin's name has the priority by many years.

This renders it necessary to rename the moss described by me under the name of *Amblystegium Holzingeri*. For it I propose the name **Amblystegium Americanum**, nom. nov.

NOTES ON NORTH AMERICAN HEPATICAE. I.

ALEXANDER W. EVANS.

The specimens of Hepaticae sent to the writer for determination often include species of more than ordinary interest. So far as these belong to the New England flora attention is called to them in a series of "Notes on New England Hepaticae," published in the recent volumes of *Rhodora*. In the present series of notes it is proposed to take up species from other parts of North America. In some cases the species to be considered will be well known to American students but will be included because the specimens quoted increase our knowledge of their geographical distribution. In other cases more critical species will be discussed. Schiffner's arrangement of the Hepaticae in Engler & Prantl's "Die Natürlichen Pflanzenfamilien" will be followed.

1. *RICCIA DICTYOSPORA* M. A. Howe, Bull. Torrey Club **28**: 163. 1901.

Collected in July, 1907, at Glencoe, Missouri, by N. L. T. Nelson (*No.* 1895). This is the second known station for the species. The type locality is Athens, Georgia, where it was discovered by R. M. Harper in 1900.

2. *MARCHANTIA DISJUNCTA* Sulliv. Mem. Amer. Acad. N. S. **3**: 62. *pl.* 3. 1846.

Collected in June, 1909, at Etowah, Tennessee, on the sides of a narrow lateral ravine, by Miss Florence McCormick, and communicated by Professor C. R. Barnes. Since the original discovery of this species at Clairborne, Alabama, by W. S. Sullivan, in 1845, it has been recorded from Arkansas, Texas, Mexico, Cuba, Jamaica, and Guadeloupe.

3. *PALLAVICINIA BLYTHII* (Moerck) Lindb.

Collected in May, 1909, at Ucluclet, British Columbia, by J. Macoun (*No.* 80). This is the third station for North America. The first two stations, both in the state of Washington, were recently recorded by Miss Clark.¹ The species is widely distributed in Europe.

4. *JUNGERMANNIA ALLENII* L. Clark, Bull. Torrey Club **36**: 303. *pl.* 20. *f.* 1-11. 1909.

Collected in June, 1909, at Ucluclet, British Columbia, by J. Macoun (*No.* 104). The type locality for the species is Mount Ranier, Washington, where it was discovered in 1900 by O. D. Allen. It has since been collected in the same region by J. B. Flett and A. S. Foster. All of the specimens so far known are incomplete, so that the true generic position of the plant cannot yet be established.

1. Bull. Torrey Club **36**: 301. 1909.

5. *LOPHOZIA BADENSIS* (Gottsche) Schiffn. *Lotos* **51**: [7]. 1903. *Jungermannia badensis* Gottsche in Rabenhorst, *Hep. Europ. No. 95*. 1859.

Collected in July, 1905, on earth along the Montmorency River, Quebec, by J. Macoun (*No. 9*). This species, which is widely distributed in northern Europe, was recently reported by Bryhn¹ from King Oscar Land and Ellesmere Land in arctic America. Apparently no other North American stations are known. It belongs to a group of closely related species of which *L. Muelleri* (Nees) Dumort. may be considered the type. Schiffner² has recently studied this group carefully and distinguishes seven species, all of which except *L. turbinata* (Raddi) Steph. are now known from North America as well as from Europe. Apparently the closest ally of *L. badensis* is *L. Muelleri* itself, and Stephani maintains that they cannot well be separated. Lindberg, Kaalaas, and other European authorities, however, recognize both species. Macvicar,³ who has recently detected *L. badensis* in Great Britain, says that it differs from *L. Muelleri* in its larger leaf-cells with smaller trigones and in its lack of distinct underleaves. These differences show very clearly in Professor Macoun's specimens.

6. *LOPHOZIA LONGIDENS* (Lindb.) Macoun.

Collected in 1908, in the Asulkan Valley, British Columbia, by A. Brinkman (*No. 153*). Although this seems to be the first record for the species from western North America, it has already been reported from several localities in Nova Scotia, Maine, and New Hampshire.⁴ It is apparently not uncommon in alpine and subalpine regions.

7. *LOPHOCOLEA CUSPIDATA* (Nees) Limpr.

Collected in August, 1908, on a wet ledge, at Milford, Pennsylvania, by G. E. Nichols. This is apparently the first record for eastern North America, although the species is abundant along the Pacific Coast from California northward. It is very close to the dioicous *L. bidentata* (L.) Dumort. but differs in its autoicous inflorescence and in the more slenderly pointed divisions of its leaves. A full description of the species may be found in Howe's "Hepaticae and Anthocerotae of California," page 115.

8. *MICROLEJEUNEA ULICINA* (Tayl.) Evans. *Mem. Torrey Club* **8**: 176. 1902. *Jungermannia ulicina* Tayl. *Trans. Bot. Soc. Edinburgh* **1**: 115. 1844. *Lejeunea ulicina* Tayl. in G. L. & N Syn. *Hep.* 387. 1845.

1. Rep. Second Norwegian Arctic Exped. in the "Fram" **11**: 32. 1906.

2. Beiträge zur Aufklärung einer polymorphen Artengruppe der Lebermoose. Verhandl. der k. k. zool.-botan. Gesellsch. in Wien **54**: 381-405. 1904.

3. Jour. Bot. **45**: 63. 1907.

4. See Evans, *Rhodora* **9**: 59. 1907.

Collected in August, 1908, on trees, at Sandy Cove, Nova Scotia, by Mrs. J. D. Lowe (*No. 26* in part). Mrs. Lowe announced her discovery of this interesting species at the Baltimore meeting of the Sullivant Moss Society, in December, 1908, and has already published a note about it in the *BRYOLOGIST* for March, 1909. As she remarks, the North Carolina station, cited by Lindberg in 1875, belongs to another species. Her record, therefore, is the first authentic one for North America. The type locality for the species is in Ireland but it is now known from numerous stations in western Europe. Mrs. Lowe's specimens are entirely sterile but are quite sufficient for identification.

The species is a very typical member of the genus *Microlejeunea*. The stems are sparingly and irregularly pinnate, with widely spreading branches, and average about 0.035 mm. in diameter. The leaves, which are distant to contiguous, spread very slightly from the axis and show a strongly arched keel. The lobe measures about 0.2 x 0.13 mm. and is ovate in outline, the apex being either rounded or very bluntly pointed. It is attached by an almost longitudinal line and arches part way across the axis. The margin is either entire or vaguely crenulate from projecting cells. The lobule is relatively large, measuring about 0.15 x 0.1 mm. and is strongly inflated. It agrees with the lobe in being ovate in outline. The free margin is either involute or appressed to the lobe. At the apex it is tipped with a single cell in the form of a blunt, more or less curved tooth, and at the base of this tooth on the inner side is a slight depression in which a hyaline papilla is situated. The leaf-cells average from 16 μ to 18 μ in length and about 14 μ in width. They are more or less convex and have thin walls, although minute trigones may usually be demonstrated. In many cases the cell structure is uniform throughout the lobe but sometimes one or two basal ocelli may be detected. When two are present they are situated end to end. The ocelli differ from ordinary cells in their more granular contents and are often difficult to distinguish. Similar ocelli occur sparingly in French specimens collected by Camus, but they are apparently absent in most of the European material examined by the writer. The underleaves of *M. ulicina* are distant and measure about 0.8 x 0.5 mm. They are ovate in outline and deeply bifid, the divisions being slender and pointed, usually four cells long, two cells wide at the base and tipped with two cells end to end.

For the differential characters separating *M. ulicina* from *M. bullata* (Tayl.) Evans and *M. Ruthii* Evans, reference may be made to the writer's

paper on the "Lejeuneae of the United States and Canada," published in the eighth volume of the Memoirs of the Torrey Botanical Club, in 1902. It is the fifth species of the Lejeuneae to be recorded from Canada, the others being *Lejeunea cavifolia* (Ehrh.) Lindb., *L. patens* Lindb., *Cololejeunea Biddlecomiae* (Aust.) Evans, and *C. Macounii* (Spruce) Evans.

9. *FRULLANIA INFLATA* Gottsche in G. L. & N. Syn. Hep. 424. 1845. Evans, Trans. Conn. Acad. 10: 10. *pl.* 3. 1897.

Collected in August, 1899, at Cloudcroft, Sacramento Mountains, New Mexico, by E. O. Wooton, growing on the bark of an oak; also in July, 1901, at Granite Falls, Minnesota, by J. A. Anderson (*No.* 52), growing on rocks; also, in August, 1909, at Walnut, Fairfield County, Ohio, by E. G. Miller, growing on the bark of an elm. The three stations just recorded add considerably to the known range of the species. It bears a strong resemblance to the very common *F. eboracensis* Gottsche and is probably often confused with this species. It is very distinct, however, in its autocious inflorescence and in its leaf-cells, which show trigones but no intermediate thickenings. In *F. eboracensis* the inflorescence is dioicous and the leaf-cells have both trigones and intermediate thickenings, making the contours of the cell-cavities irregular.

10. *ANTHOCEROS LEVIS* L.

Collected in February, 1908, at Walsingham, Bermuda, by Stewardson Brown (*No.* 430). Although this is the first member of the Anthocerotales to be definitely recorded from Bermuda, an immature *Anthoceros*, apparently also *A. levis*, was collected on the island in 1900 by W. G. Farlow.

Yale University.

SOME LOPHOZIAS OF THE VENTRICOSA GROUP.

ANNIE LORENZ.

[Read at the Meeting of the Sullivant Moss Society at Boston, Dec. 30, 1909.]

The three species here discussed, *Lophozia longidens* (Lindb.) Macoun, *L. longiflora* (Nees.) Schiffner, and *L. confertifolia* Schiffner, have all been announced for New England by Dr. Evans in Rhodora, but as they have been hitherto but scantily figured, some figures and further notes on their distribution and characters may be of interest.

The first two mentioned were originally considered as varieties of *L. ventricosa*, while the third approaches *L. alpestris*. But as they are quite distinguishable and constant in their typical forms, and each has its characteristic habitat, the modern tendency to segregation seems quite justified.

L. longidens (Lindb.) Macoun is evidently the most widely distributed of the three, and is fairly common in the White Mountains, for the writer has specimens from Mts. Osceola, Tecumseh, Carrigain, and the Scaur at Waterville, besides frequently seeing it, though not collected. Macoun, in his Catalogue Part 7, 1902, announced the first American station from Nova Scotia, on wet rocks. Dr. Evans, in Rhodora, 1907, says that "it seems to attain its best development on rocks, but it also occurs on logs."

All the specimens hitherto collected by the writer have been on bark, or in one instance upon rotten wood. Warnstorf would be justified in characterizing it, like the original species of the group, as "hemixerophyt."

About Waterville, N. H., it frequents yellow birch, either live or dead, particularly between 2500-3000 ft. alt., especially on the north and east sides of the trees, and it is fairly abundant along the trail up Mt. Osceola between these heights. Its usual companions are small sterile *Dicranum*, *Plagiothecium*, *Radula*, and little green slender crawling sterile *Jamesoniella*, just the same color as the *L. longidens*. Its zone of best development on the tree is a few feet above the ground, at a convenient height for collecting, for it does not grow about the tree bases, like *Anomodon*. With a little practice, a likely tree can be detected at a considerable distance. When it gets above the line of yellow birch, it takes to the balsam scrub.

Dr. Farlow first reported it from New Hampshire, giving several stations, and Chocora specimens given the writer are also on yellow birch. All these White Mountain stations are more or less in the shade. The Waterville specimens from the Scaur, at 2300 ft. alt. were on rotten wood, on the ground, in the shade of a spruce.

In color *L. longidens* is a rich dark green, about Hooker No. 1, in the field it looks at first sight much like *Sphenolobus exsectus*, but is easily distinguishable with the lens; besides *S. exsectus* does not, as a rule, climb trees, a very rotten log or a bank full of old wood suits it better.

Kaalaas, in his De Dist. Hep. in Nrv., 1889, where it seems to be pretty common, quotes Lindberg's long and excellent description from Arn. & Lindb. Musc. Asiae bor. p. 50. He further says of its habitat: "This species forms small, dense, dark green or brown-green tufts on moss-covered, shady, but tolerably dry cliffs, and stones or granitic mountains, sometimes, but more seldom it grows also on old tree-trunks, or on rotten stumps preferably of conifers, and then preferably grows in less dense tufts."

It is quite common in the hilly and lower parts of Norway, particularly in the southern and eastern regions, but grows neither on the coast nor on

the highest mountains. He says that he has in only a very few stations seen perianths, and in only one instance had it mature capsules.

The writer has it from along the Osceola trail with abundant antheridial plants, and both young perianths and ones with mature capsules. The "scharfsichtige" Nees described it as a variety of *L. porphyroleuca*, and while the two are perfectly distinct, besides growing in different places, they do agree in the delicately ciliate mouth of the perianth, in contrast to the small teeth of the perianth-mouth in *L. ventricosa*. Schiffner says that the teeth are often as much as six cells long, but this is better observed on a young perianth, as by the time the capsule is mature, the perianth has become somewhat weather-beaten.

The antheridial plants are quite conspicuous, bearing five or six pairs of saccate bracts, each containing one or two large antheridia. They are intercalary in their mode of growth, and old plants will sometimes show the bracts of three successive seasons.

L. longidens has leaves with sharply-pointed lobes, and is dark-green, while *L. porphyroleuca* has less clean-cut and blunter lobes to the leaves, with a shallower and more obtuse sinus. They are of about the same size, being the smallest members of this group. The latter is also usually abundantly fertile. Of course with the microscope the large trigones distinguish this latter instantly, for *L. longidens* has cells "thin-walled, except for their minute trigones."

The plants have very abundant rootlets, and cling together, by means of these and of the sharp teeth of the leaves, when a tuft is picked apart.

Gemmae are borne abundantly on the tips of the upper leaves of both sterile and antheridial plants. They have delicate walls and are obtusely tri- or quadrangular, with rounded sides. Dr. Evans says that Dr. Farlow's specimens have green gemmae, and attributes it to their having grown in the shade; but it is probably because they were not quite mature, as many of the writer's specimens have yellowish-brown gemmae.

Warnstorf in *Kryptogamen-Flora der Mark Brandenburg*, gives an excellent figure of the leaf, although it does not occur in the neighborhood of Berlin.

Bernet, in his *Cat. Hep. de la Suisse*, reports it as rare, quoting two stations for it "on rotten logs." In New England it has been so far reported from Maine and New Hampshire only, but there is undoubtedly plenty of it in Vermont, and it may occur among the higher Berkshires. Like all this group, it avoids calcareous localities.

L. longiflora (Nees) Schiffn. This "handsome species, goodly to look upon" as Nees approvingly characterizes it, was first reported for New England by Dr. Evans from Schoodic Lake, Maine. It appears to be rather well distributed among the White Mountains, as the writer has collected it from three widely separated stations, Eagle Lake on Mt. Lafayette, 4000 ft. alt., Carrigain Pond, 3100 ft. alt., and the head-wall of Split Cliff Ravine on Mt. Osceola, 3800 ft. alt., the two latter having plants with perianths. It evidently prefers high and cold localities, in the sun.

Nees, its original author, gives a comprehensive description in his *Naturges. der Eur. Leberm.* and was obviously well acquainted with the plant. Schiffner, distributing it in his *Hep. Eur. exs. III Serie, nos. 138 & 139*, quotes freely from Nees, and differs from Macoun in his *Cat. Canadian Plants*, who puts it on his list, but says "scarcely a variety." Probably he did not have good plants with perianths.

It lives among the *Sphagnum*, in bogs, the Split Cliff specimens were on the *Sphagnum* on wet rocks at the sides of the headwall. In the field it looks like a robust *L. ventricosa*, much tinged with carmine, and with fat perianths. As it is often pale in color, and is ruffly with crowded leaves, it bears a superficial resemblance to *L. Marchica*, but that is delicate apple green in color, with purple stems, and comes straggling up through the *Sphagnum*, while *L. longiflora* crawls about on top.

The leaves are crowded, more or less transversally inserted, wide, with broad, rounded sinus, and acute lobes. Leaf cells with rather smaller trigones than in *L. porphyroleuca*. The carmine of stem, leaf-bases and tips of the shoots affords a safe mark of distinction from the red-brown and purple of *L. porphyroleuca*. Rhizoids are abundant.

The perianth is large, well streaked with carmine, not split into lobes at the mouth, and furnished with separate, slightly projecting, one-celled teeth, much like *L. ventricosa*.

Nees dismisses the ♂ plants with the statement—"Männliche Blüten konnte ich nicht entdecken." Schiffner says of his exsiccatæ specimens "♂ Pflanzen hie und da vertreten," without further description, but they are few and far between. Critical examination of all the New Hampshire material resulted in the detection of one ♂ plant from Carrigain Pond, with last year's bracts. They were intercalary in their mode of growth, there were five pairs of bracts, about the same size as the ordinary leaves, but gibbous-saccate, and with rather sharper teeth to the lobes. The antheridia had departed, and no young spikes could be found.

Nees make no mention of the gemmae; Schiffner says merely that they are pale. The Carrigain Pond specimens are provided therewith. They are watery green, 3- or 4-angled, very thin-walled, one-celled and clinging together chainlike by twos and threes. These are young gemmae.

L. longiflora has probably been frequently overlooked among our New England mountains, and should be sought in Vermont.

L. confertifolia, a recent species of Schiffner's, and but a few times collected in Europe, was first found in New England, by the Cowles party, on Mt. Katahdin, and was announced by Dr. Evans in *Rhodora* for March, 1907.

Subsequently the writer detected it among some old material from Mt. Mansfield, but as it was collected in 1906, she must confess to no longer recalling the exact spot where it was found. From the appearance of the plant, it grew upon the ground, as the under side is full of specks of mica schist.

Schiffner says "it exhibits however also some characters peculiar to itself, especially in the collective aspect of the plant, so that once rightly known it is easily to be recognized again by the practised eye." This peculiar effect lies in the crowded leaves, from which its name is derived.

"It grows in flat, thickly interwoven tufts on alpine humus or moor-ground, also over earth-covered stones, in fairly damp as well as drier situations—the plants are mostly 1 cm. long, creeping, with ascending tips, and very numerous rhizoids." They are tinged with brown like *Marsupella sphacelata*. "The leaves are thickly and almost transversally attached, and concave, often also with the tips somewhat bent over and surrounding the stem on the dorsal side, so that seen from above the effect is ladder-like, giving the plant its characteristic appearance."

The leaves are broadly elliptical, with a somewhat unsymmetrical, broad, obtuse sinus, with slightly unequal lobes, often distorted by gemmae. The leaf-cells have thin walls and small trigones. The involucreal leaves are larger than the stem-leaves, and of similar form, although more deeply and sharply divided, with sharp tips to the lobes, the bracteole is about two-thirds the length of the involucreal leaf, and connate with it far up, so that the latter appears unequally trifid.

Schiffner states that the European specimens are abundantly fertile; but the Katahdin plants are sterile, while the Mansfield plants have some involucreal leaves, but no developed perianths. The species is dioicous. The perianth is green, only the little teeth about its mouth hyaline; rather small, under the circumstances, plicate at the strongly narrowed mouth,

which is provided with small, separate teeth, most two cells long. Capsule and spores are chestnut-brown.

The male plant is slender, and the usually terminal androeceum forms a cone-like spike, with about fifteen pairs of closely imbricated bracts, mostly containing two antheridia.

Gemmae present in great abundance, at the apex of the shoots pale green, on the older leaves sometimes reddish. They are small, obtusely tri- or quadrangular, seldom divided, the leaf-tips are often eaten away by them.

The species avoids limestone. Careful search of the mountains about Waterville, N. H., has been hitherto unavailing. It certainly shuns the crumbly trachytic granite of Mt. Osceola, at least. The most likely place for it is Mt. Lafayette, as that most resembles Mt. Mansfield, and any bryologist visiting that range is earnestly requested to watch for it, after passing Eagle-Lake, from the timber-line up.

Schiffner, in his notes on *L. longiflora* in his *Hep. Eur. Exsiccatae*, gives his reasons for recognizing these "kleine Arten." "It is impossible to tell which is the Stammform within the whole group, beneath which the others are to be arranged as varieties or subspecies — quite possibly none of the described or now living forms. One could imagine, that through making "little species," that naturally only are distinguished by the specialist with certainty, the study of the hepaticae will be made too difficult for the beginner. Aside from the fact, that Science needs not to take such things into consideration, it is for the beginner to consider, that one must use more trouble and time for the working into a complicated and difficult matter than in the easier field, and such as have not command over an iron diligence and a limitless patience, had better remain far away from the study of Hepaticology."

However, for anyone who is determined to have acquaintance with these plants, they will amply repay all effort expended upon them, for Warnstorf declares their study to be "die reinste Freude, die man haben kann."

Hartford, Connecticut.

December, 1909.

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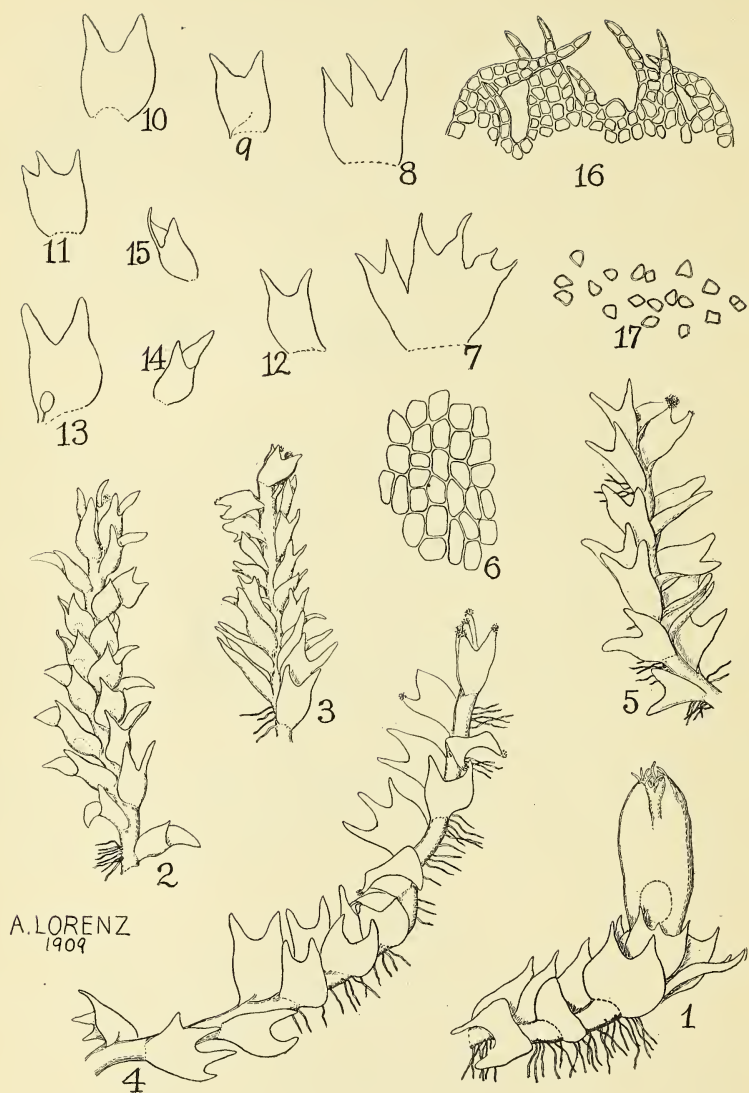


PLATE III.

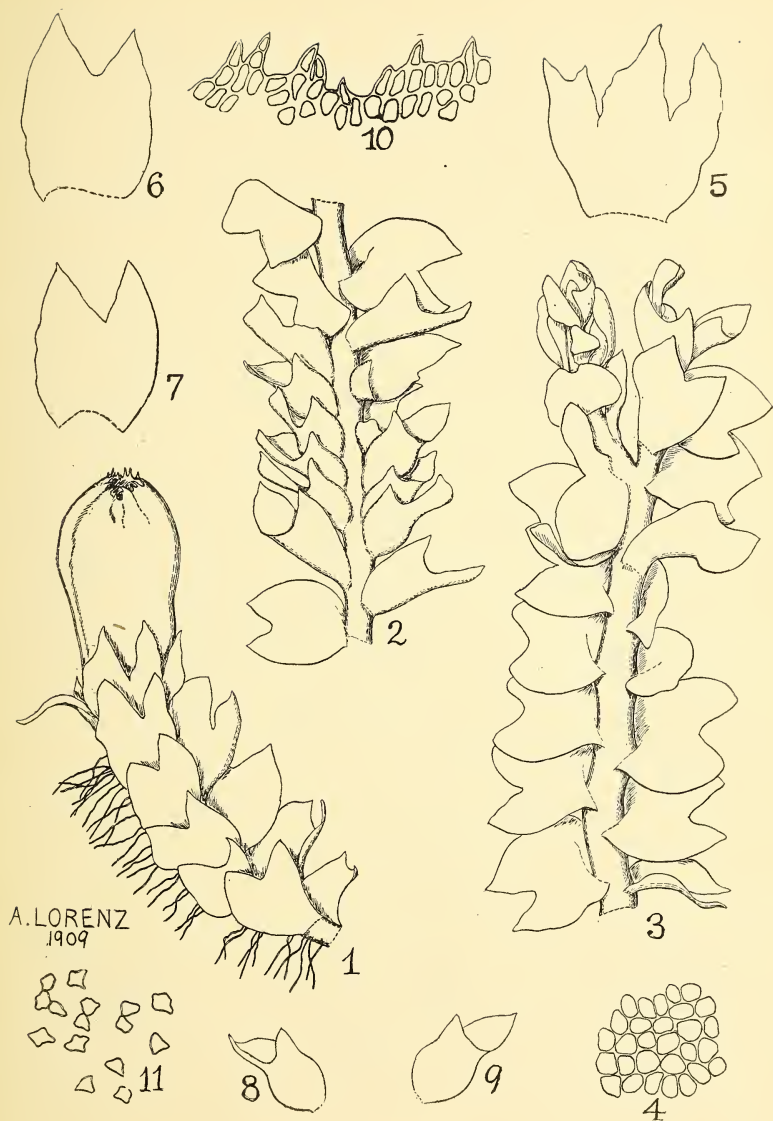


PLATE IV.



A. LORENZ
1909

Explanation of Plate 3.

Lophozia longidens (Lindb.) Macoun.

- FIG. 1. Branch with perianth, antical view. $\times 87$.
“ 2. Branch with ♂ inflorescence, antical view. $\times 87$.
“ 3. Branch with old perigonal bracts. $\times 87$.
“ 4, 5. Sterile branches. $\times 87$.
“ 6. Cells from middle of leaf. $\times 430$.
“ 7, 8. Perichaetial bracts. $\times 87$.
“ 9, 10, 11, 12. Leaves. $\times 87$.
“ 13, 14, 15. Perigonal bracts. $\times 87$.
“ 16. Teeth from mouth of perianth. $\times 430$.
“ 17. Gemmae. $\times 430$.

The figures were all drawn from specimens collected by the writer at Waterville, N. H.

All reduced to two-fifths.

PLATE 4. *Lophozia longiflora* (Nees) Schiffner.

- FIG. 1. Plant with perianth, antical view. $\times 87$.
“ 2. Plant with ♂ inflorescence, antical view. $\times 87$.
“ 3. Sterile plant. $\times 87$.
“ 4. Cells from middle of leaf. $\times 430$.
“ 5. Perichaetial bracts. $\times 87$.
“ 6, 7. Leaves. $\times 87$.
“ 8, 9. Perigonal bracts. $\times 87$.
“ 10. Teeth from mouth of perianth. $\times 430$.
“ 11. Gemmae. $\times 430$.

Figures 2, 8, 9, 11, were drawn from specimens from Carrigain Pond, N. H., the others from Waterville, N. H.

All reduced to two-fifths.

PLATE 5. *Lophozia confertifolia* Schiffner.

- FIG. 1, 2, 3, 4. Sterile plants, antical view. $\times 87$.
“ 5. Cells from middle of leaf. $\times 430$.
“ 6, 7, 8, 9, 10. Leaves. $\times 87$.
“ 11. Gemmae, $\times 430$.

The figures were all drawn from specimens collected by the writer on Mt. Mansfield, Vt.

All reduced to two-fifths.

SULLIVANT MOSS SOCIETY NOTES.

Mrs. Smith makes the following explanation to subscribers of *THE BRYOLOGIST* and to Members of the Sullivant Moss Society whose recent communications may have received tardy acknowledgement. On the afternoon of Dec. 31st a small party of visiting botanists had been to the Agassiz Museum to see the Sullivant herbarium, and had enjoyed the the hospitality of Dr. and Mrs. Farlow at afternoon tea, this being the concluding event of the Sullivant Moss Society meeting at Boston. Returning from Cambridge, Mrs. Smith fell and broke her right arm, incapacitating its use probably for some time to come, as the wrist also was injured.

James A. Graves, of Susquehanna, Pa., died December 28, 1909, at the age of eighty-one years, of pneumonia. Of late he had become feeble, but to the last he retained the keenest enjoyment in his connection with our society and with one or two others of like order.

The Sullivant Moss Society having been honored by an invitation to send a delegate to the ceremony of Dedication of the New Hall of the College of Physicians of Philadelphia on December 10, 1909, Mr. William B. Davis was appointed. The delegates and specially invited guests, in academic dress as required, met in a nearby church and marched two by two to the place of dedication. Our delegate had the honor of marching immediately after Mr. Andrew Carnegie, who had contributed \$100,000 to help build the Hall. This invitation is regarded by Mr. Davis as a recognition of the place which our Society holds in the list of scientific bodies, "since only the acknowledged learned societies had been requested to send a representative." In the evening a banquet was given the delegates at the Bellevue-Stratford Hotel. Speeches were made by Mr. Carnegie, Dr. S. Wier Mitchell and others.

NEW MEMBERS.—The January number listed 187 members, since then we add the following: No. 188. Mr. William Mansfield, Ph.D., College of Pharmacy, 115 West 68th street, New York City. No. 189. Prof. Charles Carter, Parsons College, Fairfield, Iowa. No. 190. Mrs. Mary G. Spencer, 4923 Warrington Ave., Philadelphia, Pa. No. 200. Mrs. Clara J. Middlemus, 262 Park Ave., Worcester, Mass. No. 201. Mrs. Mary K. Pierce, Hillsboro Lower Village, New Hampshire. No. 202. Brother Victorin, Longueuil College P. O., Quebec, Canada. No. 203. Dr. Istvan Gyöeffy, Lőcse, Hungary.

REPORT OF THE SULLIVANT MOSS SOCIETY MEETING.

The Society held its sixth public meeting in Boston on December 30th, 1909, in connection with the American Association for the Advancement of Science, which was having its sixty-first meeting. We met in the Hall of the Boston Natural History Society on Boylston street, holding an all-day meeting, the morning being devoted to social purposes, and to the arrangement and inspection of the exhibits. As there was other botanical sections in session all day, this gave an opportunity for some who were unable to attend in the afternoon to join us for an hour.

The formal meeting was called to order at 2.30 P. M., presided over by Dr. Evans, who first read some letters from absent members, among them letters from Dr. Best, Prof. Holzinger, Prof. Fink, Dr. Bessey, and one from Prof. Farlow, inviting the out-of-town members to visit the Agassiz Museum on Friday afternoon and examine Sullivan's herbarium.

The papers were then presented. The first by Dr. Sheldon, "Collecting in the Cranberry Glades, W. Va., illustrated by two photographs. The Glades are swampy tracts in plateau country at about 4000 ft. alt., reached only by a lumber railroad, and offer much of interest.

The second paper was by Mrs. Britton, "The Genus *Splachnobryum* in North America," discussing a species from the greenhouses of the New York Garden, and showing a slide of this rare species, and figure from the Journal of Botany.

The third paper was by Mr. R. S. Williams, "A Plea for the Collection of Better Specimens." He finds that the common species are often carelessly and incompletely collected and represented, even in the large herbaria.

The fourth paper was by Miss Lorenz, "Some *Lophozias* of the *Ventricosa*-group," discussing *L. longidens*, *L. longiflora* and *L. confertifolia*, with three plates; it is printed in this number of THE BRYOLOGIST.

The fifth was by Dr. Nichols on the "Ephemerae of Connecticut," reviewing the genus; showing that we have, instead of the four given on the List of Connecticut Bryophytes, only three, one of which, *E. spinulosum*, was not originally on the List.

The sixth paper was given by Mr. Chamberlain, "A Curious *Hylocomnium*," describing a peculiar form of *H. umbratum*, with fimbriate leaf-tips, collected near Montreal by M. Dupret.

The last was by Dr. Evans, who spoke on "Vegetative Reproduction in *Metzgeria*," illustrated by drawings upon the blackboard. The gemmae of

most species, such as *M. furcata* and *M. crassipilis*, afford a safe method of identification of sterile specimens.

The meeting adjourned soon after four o'clock. Among the exhibits was a collection of New England bryophytes and lichens, put up in Denton's butterfly boxes, prepared by Miss Cherrington and Miss Clapp for the New England Federation of Natural History Societies. Miss Miller sent some of the Society's lichens, Miss Greenwood had micro-photographs of the *Cephalozia*, Mr. Chamberlain showed some of Bauer's European Moss exsiccatae. Miss Lorenz had her drawing-book, Miss Clark, some of her monthly moss charts. Mr. Dutton sent a complete set of New England Sphagnums, beautifully mounted on separate sheets.

We had in all over sixty visitors, at least half of whom attended the formal program. Our thanks are due to Miss Cherrington, Miss Clapp, and Mr. Webster, for their kind assistance in arranging the exhibits, as well as to our own indefatigable secretary, Mrs. Smith, for all her efforts expended in organizing this most successful and enjoyable meeting.

Hartford, Conn.

A. LORENZ.

OFFERINGS FOR JANUARY 1910.

(To Society Members only. — For postage.)

Mr. D. Lewis Dutton, Brandon, Vermont, R. F. D. 1. *Pogonatum capillare* (Michx.) Brid.; *Aulacomnium heterostichum* (Hedw.) B. & S.; *Mnium sylvaticum* Lindb.; *Cladonia coccifera pleurota* (Flk.) Schaer. All cfr. Collected in Vermont.

Miss Emily Crosswell, 20 St. James Ave., Boston, Mass. *Physcia hypoleuca* (Muhl.) Tuck. Collected in New Hampshire.

Rev. James Hansen, St. John's University, Collegeville, Minn. *Parmelia caperata* (L.) Ach.; *Cladonia sylvatica* (L.) Hoffm. Collected in Minnesota.

Mr. Frank E. McDonald, 417 California Ave., Peoria, Illinois. *Rhynchostegium serrulatum* (Hedw.) J. & S. Collected in Illinois.

Mr. George B. Kaiser, 524 Locust Ave., Germantown, Pa. *Hypnum Haldenianum* Grev. Collected in Pennsylvania.

Mrs. B. J. Handy, 139 Rock St., Fall River, Mass. *Fontinalis flaccida* Ren. & Card. (?). Collected in Massachusetts.

Mr. N. L. T. Nelson, Des Moines College, Des Moines, Iowa. *Catharinea angustata* Brid.; *Anomodon attenuatus* Huebn.

Mr. W. W. Calkins, Berwyh, Cook Co., Illinois. *Dicranella varia* (Hedw.) Schimp. mixed with *Barbula fallax* Hedw. (?) cfr. Collected in Illinois.

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MAY 1910



THE BRYOLOGIST

AN ILLUSTRATED BIMONTHLY DEVOTED TO
NORTH AMERICAN MOSSES
HEPATICS AND LICHENS

FOUNDED IN 1898

By

ABEL JOEL GROUT, Ph.D.

EDITOR

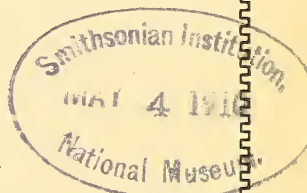
ANNIE MORRILL SMITH

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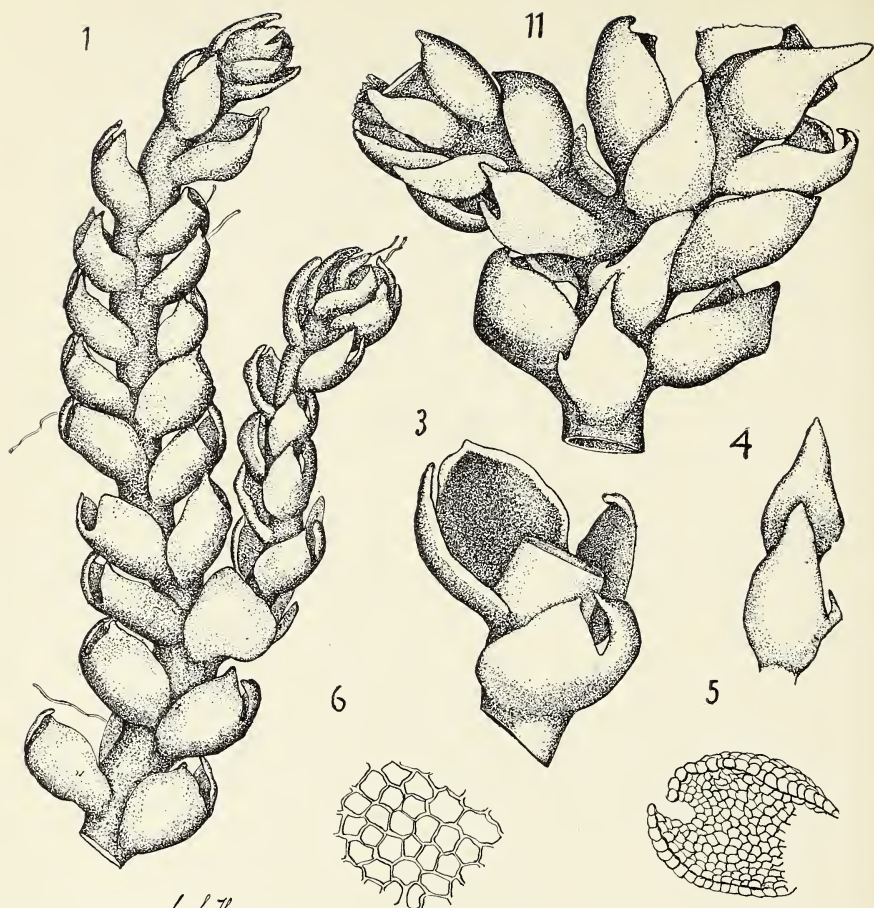
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L. C. Hayes.
1910.

PLATE VI. *Pleuroclada albescens* Spruce.

Fig. 1. Plant showing lateral branching and axillary difform leaf, broadly ovate, apex acute, subcordate at base, dorsal view $\times 47$.

Fig. 2. Plant showing lateral branching and underleaves, ventral view $\times 47$.

Fig. 3. Segment plant showing insertion and concavity of leaves and appressed underleaf, $\times 47$.

Fig. 4. Two overlapping underleaves $\times 47$.

Fig. 5. Leaf showing cell structure and sinus $\times 47$.

Fig. 6. Cells from center of leaf $\times 120$.

THE BRYOLOGIST

VOL. XIII

MAY 1910

No. 3

PLEUROCLADA ALBESCENS FOUND IN UNITED STATES OF AMERICA.

CAROLINE COVENTRY HAYNES.

Jungermannia albescens Hook. Brit. Jung. pl. 72 and Suppl. pl. 4. 1816.

Cephalozia albescens Dumort. Recueil. 18. 1835.

Pleuroclada albescens Spruce. On *Cephalozia*, 78. 1882.

This rare species was collected by Mr. C. V. Piper (95) on Mount Rainier, Washington, alt. 6500 ft. August, 1895. Herb. New York Botanical Garden. The writer detected it while studying the set of which it formed part, her determination being verified by Dr. Evans, who recently very kindly communicated part of a specimen collected by Mr. E. Jones, Sperry Glacier, Montana, alt. 7500 ft. August 29, 1909. Herb. A. W. Evans (10704). Both specimens show sterile plants. The species is distributed in the alpine regions of Northern Europe, and there are several stations for it in Greenland. The following description is derived from the works cited above and from Mr. W. H. Pearson. Hep. Brit. Is.

Dioicous, growing in large, loosely matted patches, tufts depressed: plants, American, under 9 mm. in length; Sir William Hooker makes European, from half to three-fourths of an inch in length; of a whitish green color, when dry with a bluish-white tinge; procumbent, loosely subpinnate, branching two or three times dichotomously; slightly radiculose, rooting up to apex of stem; leaves somewhat distant, alternate, almost transversely inserted, slightly succubous, concave, almost hemisphaerical, bilobed one-third their length, segments ovate, triangular, connivent, sinus narrow or subobtusate; cells quadrate or hexagonal, smooth, pellucid, with delicate walls, no trigones; axillary leaf produced partly from the stem and partly from the adnate branch, differs from the other leaves in being broadly ovate, subcordate at base, apex acute, not bifid; underleaves subcontiguous, appressed, plane, slightly shorter than the leaves, broadly ovate to ovate-lanceolate, acute or subacuminate, rarely obtuse, on one side above the base deeply unidentate, sometimes unidentate on both sides or entire; perianth terminal on short or long branches, these radiculose at the base; bracts three pairs, appressed, convolute, the lower bracts a little larger than the leaves,

the upper bracts almost three times larger, free or slightly connate at base, oblong-quadrate, one-third bilobed, rarely trifid, segments subacuminate, acute, bractioles smaller, entire or bifid at apex, provided on both sides near the base with one to three large teeth; perianth highly exserted, seven times larger than the stem leaves, clavate or linear-fusiform, deeply trigonous, mouth constricted, often scariose, afterwards lacerate and erose, fleshy, five to eight cells thick near the base, cells large, elongate, pellucid; calyptra, pyriform, delicate, of a purple-brown color like the spores and elaters; androecia?

Habitat: damp earth in alpine localities.

Its nearest allies are *Hygrobrella* and *Anthelia*, from both of which it principally differs in having all branches lateral, with a difform leaf subtending the branch and in having very concave leaves with connivent lobes.

Highlands, New Jersey.

MOSS FLORA OF THE NORTH SHORE OF LAKE SUPERIOR IN MINNESOTA.

JOHN M. HOLZINGER.

ITINERARY.—In July and August, 1902, the writer in company with Prof. Bruce Fink and Mr. H. Hibbard, made a botanical exploration of the north shore of Lake Superior, under the auspices of the Minnesota Botanical Survey, and this paper enumerates the mosses of that expedition collected by the writer.

The party pitched tent in the outskirts of the village of Grand Marais, and whenever longer tours were not possible the vicinity of that village was carefully explored, the labels for the plants thus collected bearing date of July 15 to August 7, the date of breaking camp to proceed to Grand Portage.

The longer collecting trips from Grand Marais camp are as follows:

1.—July 19 along the Little Devil's Track trail, over rough wooded and bushy country, to a point some five miles from the village.

2.—July 20, along the so-called Old Iron trail, at this time not in use and obliterated by young tree growth so that it was necessary for the party to blaze a path through this stretch of rather continuous dense forest growth, making progress slow. The farthest point reached on this trip was not quite three miles from camp.

3.—July 28, to Rosebush Falls, a point about three miles west, close to the Lake shore. The trail here was easy and open leading for a considerable stretch over granitic "roches moutonnées" interspersed with stretches of

forest and swamp. Rosebush Falls proved a most satisfactory collecting ground, as the many fine things reported from here attest. The creek which here falls over a perpendicular ledge of some twenty feet, close to the Lake shore, was followed up for about one-half mile.

4.—July 31, the trip along the Gunflint trail to the large swamp about ten miles north of the camp. This yielded especially fine *Sphagna*.

5.—August 5, a trip along the mail trail to Two Harbor, to a point about three miles beyond Rosebush creek.

6.—August 11, 12, two exploring trips over Grand Portage Island, comprising about seventy acres of rocky and wooded territory, an area with a very rich and varied moss flora. The party had meanwhile been conveyed by steamer to Grand Portage Island, and by permission of its owner, Pete Gagnon, had pitched camp on the north side of it.

7.—August 13, a trip to the mainland to the east of the island, thence following the trail to the base of Mount Josephine, 1,328 feet alt. (i. e. above sea level) about a mile inland. The mountain was ascended from the west side without difficulty, though in places the ascent was quite steep.

8.—August 14, another trip to the mainland, and to the base of Mount Josephine, resulted in striking a very rich moss flora, including *Sphagna*, principally on the edge of a small lake or pond without outlet, bordered all around by a sphagnum bog.

9.—August 15, the last trip, at least of the writer, on this expedition, to Hat Point, the bold rocky wood covered peninsula projecting southward for several miles into Lake Superior from Mount Josephine. The region is indescribably rugged, being extensively covered by gigantic jagged fragments the size of houses, the interstices between which are frequently bridged over by huge cushions of moss, and the shaded sides of which are covered with great colonies of lichens. This proved to be one of the richest collecting grounds visited on this expedition.

The material gathered from the several localities above named yielded two hundred and thirty-one species, varieties and forms, one hundred and forty-five, given herewith, have not before been reported from Minnesota. Several are new to North America. Specimens of all species, etc. from all stations are deposited in the Herbarium at the University of Minnesota.

ACKNOWLEDGEMENTS —The following persons have aided in determining groups of mosses for this report: Dr. A. J. Grout has named principally the species of *Eurhynchium* and *Brachythecium*; Dr. G. N. Best principally species of *Leskea*, *Thuidium* and *Orthotrichum*; Messieurs Cardot and

Thériot have named species of Mnium, Bryum and especially Hypnum, this last a very voluminous task; M. F. Renauld has named the Harpidia; Dr. Bryhn, principally Dicrana and Amblystegia; Dr. Julius Roell, the Sphagna. It has seemed desirable to give credit to these gentlemen also under the species that were determined them, as well as to two others to whom belongs the credit of naming individual species. To all of these persons grateful acknowledgement is herewith expressed.

Following is the list of species and varieties new to the state, new species or species new to North America being printed in caps and small caps. Since the list was made out the species starred have been found in other localities and are therefore not now new to Minnesota.

- | | |
|---|--|
| <i>Amblystegium fluviatile</i> (Sw.) B. & S. | <i>Bryum inclinatum</i> (Sw.) B. & S. |
| AMBLYSTEGIUM HYGROPHILUM (Jur.) | forma. |
| B. & S. forma OBSOLETINERVIS | <i>Bryum intermedium</i> Brid. |
| Card & Thér. | BRYUM MILDEANUM Jur. |
| <i>Amblystegium Juratzkanum</i> B. & S. | <i>Bryum pallens</i> Sw. |
| " <i>serpens pinnatum</i> B. & S. | " <i>pallescens</i> Schwaegr. |
| <i>Amphidium Mougeotii</i> (B. & S.) Sch. | " <i>pendulum</i> (Hornsch.) Sch. |
| <i>Andreaea petrophila</i> Ehrh. | *BRYUM PSEUDOTRIQUETRUM COMPACTUM Sch. |
| <i>Bartramia pomiformis crispa</i> B. & S. | <i>Campylium Sommerfeltii</i> (Myr.) Bryhn. |
| <i>Blindia acuta</i> (Dicks.) B. & S. | <i>Catharinaea angustata</i> Brid. |
| <i>Brachythecium glareosum</i> (Br.) B. & S. | <i>Cynodontium schisti</i> (Oed.) Lindb. |
| <i>Brachythecium Novae - Angliae</i> (Sull. & Lesq.) Jaeg. forma. | " <i>polycarpum strumiferum</i> (W. & M.) Sch. |
| <i>Brachythecium plumosum homomallum</i> B. & S. | CYNODONTIUM STRUMIFERUM SCABRIUS Hag. |
| <i>Brachythecium populeum</i> (Hedw.) B. & S. | <i>Dichelyma falcatum</i> (Hedw.) Myr. |
| <i>Brachythecium reflexum</i> (Stark) B. & S. | <i>Dichodontium pellucidum</i> (L.) Sch. |
| <i>Bryum binum</i> Schreb. | <i>Dicranella cerviculata</i> (Hedw.) Sch. |
| " <i>capillare</i> L. | <i>Dicranum Bergeri</i> Bland. = <i>D. Schraderi</i> Schwaegr. |
| " <i>cirratum</i> Hoppe & Hornsch. | DICRANUM BERGERI RUPINCOLA Kindb. |
| " <i>cuspidatum</i> Sch. | <i>Dicranum fragilifolium</i> Lindb. |
| BRYUM ELEGANS FERCHELII (Funck) Breidl. | DICRANUM LONGIFOLIUM HAMATUM Jur. |
| BRYUM GRAEFIANUM Schlieph. | * " " SUBALPINUM Milde. |
| | * " SCOPARIUM ORTHOPHYLLUM Brid. |
| | " <i>strictum</i> Schleich. |

- Distichium inclinatum* (Ehrh.) B. & S.
Ditrichum flexicaule (Schwaegr.) Hpe.
Ditrichum flexicaule (Schraegr.) Hpe. forma *luxurians*.
Encalypta vulgaris Hedw.
Eurhynchium diversifolium B. & S.
Grimmia ovata W. & M.
 " *unicolor* Grev.
Hypnum aduncum polycarpon Bl.
 " " " "
 forma *amblystegioides* Ren.
Hypnum aduncum attenuatum Boul.
 forma *amblystegioides depauperata* Ren.
Hypnum alpestre Sw.
 " *arcuatum* Lindb.
 " *chrysophyllum brevifolium* Ren. & Card.
Hypnum cordifolium Hedw.
 " *cupressiforme* L.
 " *curvifolium* Hedw. forma ad *Hypnum arcuatum accedens* fide Thérôt.
Hypnum dilatatum Wils.
 " *fertile* Sendth.
 HYPNUM FLUITANS JEANBERNATI Ren. passant au forma TENELLA Ren.
Hypnum imponens Hedw.
 " *ochraceum* Turn.
 " " *flaccidum* Milde.
 " *palustre* L.
 " " " var. *gracilius* Ren.
 HYPNUM PALUSTRE JULACEUM Sch.
 " " SUBSPHAERICARPON (Schleich.) B. & S.
 HYPNUM PALUSTRE var. à peu près
 HYPNUM INTERTEXTUM Voit., fide Renauld.
- Hypnum revolutum* Mitt.
 " *Renauldi* Kindb.
 " *Richardsoni* (Mitt.) L. & J.
 " *stellatum* Schreb.
 " *uncinatum plumosum* Sch.
 " " *plumulosum* B. & S.
Hypnum uncinatum plumulosum B. & S., forma *gracilescens* = *Hypnum contiguum* Nees.
Hypnum uncinatum subjulaceum B. & S.
Leskea Wollei Aust. = *Leskea cyrtophylla* Kindb.
Leskea nervosa (Schwaegr.) Myr.
 " " *flagellifera* Kindb.
 " *tectorum* (L. Br.) Lindb.
Leucodon brachypus Brid.
Meesia tristicha (Funk) B. & S.
Mnium affine Bland.
 " *cinclidoides* Blytt.
 " *Drummondii* B. & S.
 " *hymenophylloides* Huebn. forma *densa*.
Mnium orthorrhynchum B. & S.
 " *punctatum elatum* Sch.
 " *subglobosum* B. & S.
Oncophorus virens Brid.
 " *Wahlenbergii* Brid.
Oreoweisia serrulata (Funk) Sch.
Orthotrichum fastigiatum Bruch.
 " *obtusifolium* Schrad.
 " *praemorsum* Vent.
 " *rupestre* Schleich.
Philonotis fontana caespitosa (Wils.) Sch.
 PHILONOTIS MARCHICA LAXIRETIS Card. & Thér.
Pogonatum alpinum arcticum (Sw.) Brid.

- Polytrichum Ohioense* Ren. & Card.
 “ *strictum* Banks.
- Plagiothecium denticulatum laetum*
 Aust. = *Plagiothecium passai-
 cense* Aust.
- Plagiothecium elegans* (Hook.) Sch.
 forma.
- PLAGIOTHECIUM ELEGANS NANUM (Jur.)
 Walth. & Mol.
- Plagiothecium roeseanum* (Hpe.) B.
 & S.
- *PLAGIOTHECIUM RUTHEI Limpr.
- Plagiothecium turfaceum* (Lindb.)
 Sch.
- PYLAISIA POLYANTHA BREVIFOLIA
 (Lindb. & Arn.) Par.
- Pylaisia polyantha Jamesii* (Sulliv.)
 E. G. Britton.
- Palaisia Schimperi* Card.
 “ *subdenticulata* B. & S.
- Rhabdoweissa fugax* (Hedw.) B. & S.
- Rhacomitrum aciculata* (L.) Brid.
 “ *fasciculare* (Schrad.)
 Brid.
- Rhynchostegium rusciforme* (Weiss)
 B. & S.
- Schistidium gracile* (Schleich.)
 Limpr.
- Schistidium alpicola rivulare* (Brid.)
 Wahlenb.
- Sphagnum acutifolium* Ang. var.
versicolor Warnst.
- Sphagnum acutifolium gracile* Röhl
 forma *flagelliforme* Röhl subf.
viride Roell.
- Sphagnum acutifolium gracile* Röhl
 forma *purpureum* Roell.
- Sphagnum Girgensohnii gracilescens* Grev.
- Sphagnum Girgensohnii tenellum*
 Röhl forma *capitatum* Röhl subf.
ochraceo-virescens Roell.
- Sphagnum Girgensohnii tenellum*
 Röhl forma *virescens* Roell.
- Sphagnum medium imbricatum* Roell
 forma *roseum* Roell.
- Sphagnum Schimperi deflexum* Roell
 subf. *virescens* Röhl.
- Sphagnum Schimperi deflexum* Roell
 forma *viride* Roell.
- Sphagnum squarrosum cuspidatum*
 Warnst. forma *pallido-virescens*
 Roell.
- Sphagnum squarrosum patulum*
 Roell forma *flavo-virens* Roell.
- Sphagnum Wilsoni quinquefarium*
 Roell forma *patulum* Roell subf.
purpurascens Roell.
- Sphagnum Wulfii squarrosulum*
 Russ. forma *viride* Roell.
- Tetraplodon angustatus* (L. f.) B.
 & S.
- THUIDIUM ABIETINUM HYSTRICOSUM
 Mitt. (Husnot thinks this variety
 does not differ from the species).
- Trichostomum crispulum* Br.
- Tortella fragilis* (Drumm.) Limpr.
- TORTULA SUBINTERMEDIA (Ren. &
 Card.) Card., nom. nov.
- Ulota Americana* Mitt.
- “ *crispula* Bruch.
- Webera commutata* Sch.
- “ *cruda minor* Sch.
- “ *elongata* (Dicks.) Schwaegr.)
- “ *nutans caespitosa* (H. & H.
 Huebn.
- Webera nutans subdenticulata*
 (Brid.) Huebn. & Sch.
- WEBERA NUTANS (Schreb.) Hedw.
 forma *RETILAXIORE* Card. & Thér.
- WEBERA NUTANS forma *INTERMEDIATE*
 between var. *CAESPITOSA* and var.
SUBDENTICULATA, fide Cardot.
- *WEBERA PROLIGERA (Lindb.) Kindb.

M. Theriot's Note on *Hypnum uncinatum* and its Forms in North Minnesota.

It is rather difficult to find one's way among the numerous varieties of this polymorphous species, especially since absolutely authentic type specimens are not available. It is also probable that several of the described varieties are synonyms.

Thus in studying closely the var. *attenuatus* Bry. Eur., it seems very little different from the var. *plumosum*; also the var. *polare* seems not far removed from var. *gracilescens* (if descriptions are compared) etc.

I have had over two hundred specimens of *Hypnum uncinatum* to name from northeastern Minnesota. If I had been obliged to try to place each of these specimens under the eight or ten varieties actually described I would have had to spend a year of time and surely this species is not worth that much trouble. A reasonable amount of time must suffice.

In order that my labor may be appreciated and critically verified, it has seemed to me necessary that my critics endeavor to occupy the view point which I have taken. I have taken as basis for my study the descriptions of M. Renauld in "*Muscologia Gallica*," which has permitted me to make a preliminary classification as follows: fifty belonged to the *type*, thirty to forma *plumosa*, thirty to var. *plumulosum*, forty to var. *subjulaceum*, holding in mind the following characters:

Typical plants erect, robust, leaves large, strongly plicate, falciform but not circinate; forma *plumosa* plants smaller, more or less pinnate, leaves folded, more straight, contracted from above the base into a long subula, circinate; var. *plumulosum* plants slender, leaves small, little or not striated, of variable form; seta short, capsule small; var. *subjulaceum* plants robust, stems erect, leaves erect or secund, plicate, costa large, tissue loose, cells more short. I then took up again my task of seeking to form a personal opinion and I have arrived at the following conclusions:

1.—The well-characterized type is rather rare in the region explored.

2.—Forma *plumosa*, understood as it is in the above definition, is very abundant, it is distinguished as easily at least as is the var. *plumulosum*, and it deserves more than the place of a simple "forma." My view would be to make of it a variety as did Schimper.

3.—Var. *plumulosum* is more difficult to define; one is obliged to bring to it forms quite different; its stems are more or less pinnate, its leaves are more or less circinate, more or less long, more or less folded. For my part I do not understand it very well, at least not as M. Renauld has defined it,

and I find that it is more difficult to distinguish between forma *plumosa* and var. *plumulosum* than between the species and forma *plumosa*, at least if one accepts under the designation *plumulosum* only specimens with leaves little or not folded and this variety finds itself more limited and becomes nearly it seems to me, var. *contiguum*.

4.—Ninety-nine specimens belong to this group representing the var. *subjulaceum*. I have brought them under the var. *orthothecioides* but they are not identical with the type of Lindberg, being less robust, their leaves are more falciform, and form a hook at the end of the branches. To this last statement M. Cardot seems to take exception, writing in pencil "Pas la form *orthothecioides*." He further remarks "The extreme forms of var. *plumulosum* with leaves not plicate with stems radiculose.—*Hypnum Moseri* Kindb. and *Hypnum contiguum* Nees."

Winona, Minnesota.

NOTE.—The Department of Botany, under whose auspices the exploration here recorded was made, has for five years failed to publish this report, But even though some of the value is lost by delay, it is here published at the first opportunity afforded the writer.

ON COLLECTING MOSSES.

R. S. WILLIAMS.

[Read at the Meeting of the Sullivant Moss Society at Boston, Dec. 30, 1909.]

In working over a number of moss genera the past season and examining rather carefully all the specimens contained in the herbarium of the New York Botanical Garden, as well as in some private collections, it was rather surprising to find how few really first-class plants had been obtained of many even common species. It seems to be the ordinary impression that mosses are among the easiest of plants to collect, and in certain respects this is true, for they are mostly within reach, can be removed without difficulty from the substrata and take up but little room or weight; moreover they can be collected without the necessity of carrying a heavy press into the field, and if a little dry at night, can be softened up and made into about as fine specimens as if laid out and pressed immediately. Also if one wishes to pad out the numbers of their collection there is perhaps no easier way than to grab at everything in sight that looks a bit mossy, attach numbers and give to some one else to name (this last being very important);

a dozen such specimens can often be made and put away in as many minutes; if the plants are covered with mud, scorched up by the sun or overgrown by half a dozen other species so that it is somewhat doubtful just what the number relates to, all the better, apparently, from some points of view, for such conditions are surely apt to cause doubt in determining, even if they do not bring forth various quite new names.

Now, from these remarks, please do not think for a moment that the writer wishes to discourage in any way the collecting of mosses, but in looking over most large collections it is quite evident that the majority of specimens are in such poor shape that if the condition of the leaves, flowers and fruits was as readily seen as in the ordinary flowering plants, the merest tyro in collecting would have been apt to look about for better specimens to fairly represent the species and to preserve for future study.

By way of illustration I may mention that in looking over between seventy-five and one hundred specimens of *Dicranoweisia crispula* (all collected in Europe by the way), there were not, apparently, three specimens that had been obtained at just the proper time, namely, when the mature capsules were just beginning to open. The same conditions hold in various species of *Dicranum*. It was often necessary to examine dozens of specimens before finding one that was in any where near a perfect condition. It would appear that usually the first lot of specimens observed by the collector are the ones preserved, yet I think I am not overstating the case in saying that nine times out of ten the first obtained, even if fruiting, are apt to be either too old or too young, and not unfrequently one has to wait over two or three years in some regions to find a given species in the best shape, although it may fruit, or attempt to fruit, each year. Certainly it is always well, if time permits, to look about for more and better specimens, for mature fruit, for flowers, for fine sterile tufts of nearly anything and everything you may run across, and it will be found, often, not an easy but a rather difficult matter to get the best, although the prize, I believe, is always worth the trouble. Of course, when traveling, many specimens must be obtained "on the fly" or not at all, and these may be very valuable. So do not neglect such but be sure to always look for the best and an abundance of it when possible.

New York Botanical Garden.

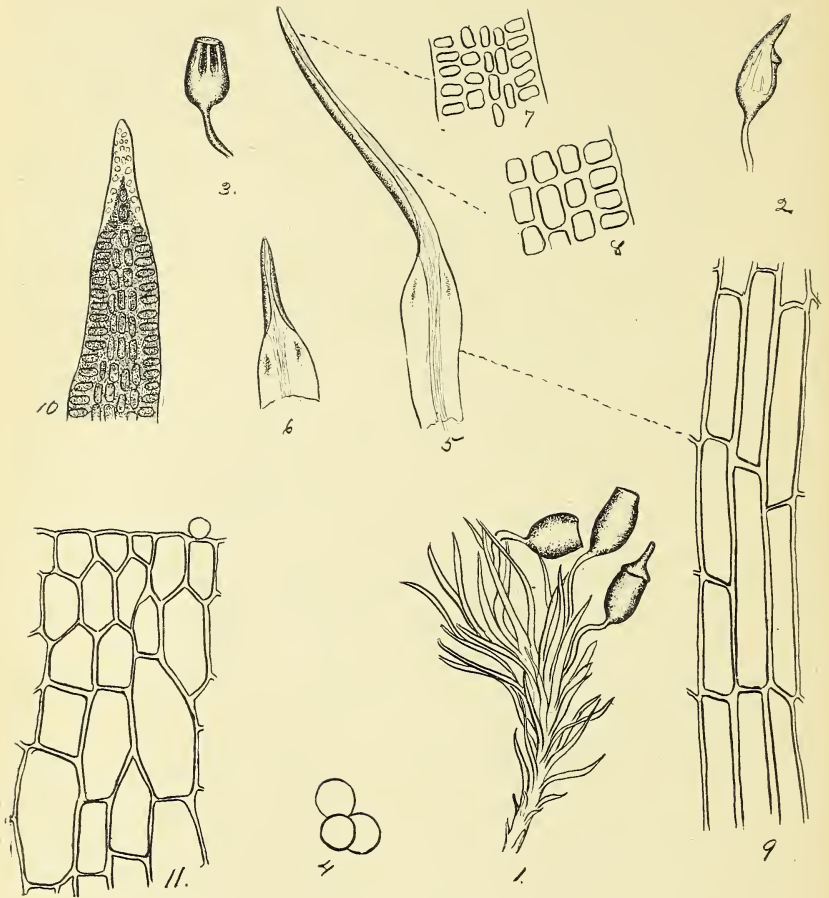


PLATE. VII. *Grimmia Olympica*.

Grimmia Olympica: 1=Plant, $\times 13$. 2=Capsule with calyptra, $\times 13$. 3=Old capsule, $\times 13$. 4=Spores, $\times 530$. 5=An upper leaf, $\times 34$. 6=A lower leaf, $\times 34$. 7=Cells near tip of leaf, $\times 405$. 8=Cells near middle of leaf-blade, $\times 405$. 9=Cells near middle of leaf-sheath, $\times 405$. 10=Tip of perichaetial leaf, $\times 200$. 11=Surface cells of capsules at mouth, $\times 405$.

GRIMMIA OLYMPICA A NEW SPECIES.

T. C. FRYE.

In August of 1907 a party of about forty of the Mountaineers, an organization with headquarters in Seattle, made a three-weeks' trip into the heart of the Olympic mountains. The writer was a member of this party, and made a point of picking up lichens and bryophytes. The Olympics form a roughly rounded pile of erosion peaks and ridges about sixty miles across, lying between Puget Sound and the Pacific Ocean. The highest point is Mt. Olympus, altitude 8,200 feet. The snow fall in these mountains is very heavy; this at their latitude makes the summer snow line only about 4,000 feet. There are therefore a number of glaciers, of which the largest is Humes' Glacier, perhaps half a mile wide and about two miles long. It is on the southeast side of Mt. Olympus, and is one of the sources of the Queets river. The region is not very well known, either geographically or biologically; only a few botanists have been in the region. A lists of the plants secured, so far as they could be determined within a short time, was published in the *Mountaineer*, Vol. 1, No. 4, 1908; Seattle. This plant, among others, was laid aside for further study. It was described and named by Mrs. E. G. Britton; the drawings were made by Miss Elsie K. Waddingham, of Seattle.

Grimmia Olympica E. G. Britton n. sp.

Plants small, in dull brown or green mats in glacial mud; stems procumbent at base, erect-ascending, branching at apex, 5-8 mm. high; leaves spreading or slightly secund, 1-2 mm. long, without hyaline points except on the perichaetial leaves, point canaliculate, subulate; basal cells clear, oblong, upper thick; margins incurved; perichaetial leaves longer, with very short hyaline tip. Dioicous? Seta secund, 1-2 mm. long, slightly exserted beyond the perichaetial leaves; capsule ovoid, 0.5-1 mm. long, ribbed when dry; calyptra mitrate; lid short-apiculate; annulus large, falling with the lid; peristome none; mouth small, bordered by several rows of brown smaller cells; cells of capsule walls linear, porose, thick-walled; spores smooth, pale yellow, .008--.010 mm., maturing in August.

Differs from *Grimmia gymnostoma* Cul. Rev. Bryol. 23: 108, 1896: in that its capsule is exserted on a curved seta, its perichaetial leaves are without a hyaline margin and with a very short hyaline point.

Type locality: Olympic mountains, Washington. Queets river valley, near Humes' glacier. Altitude 5,500 feet. T. C. Frye No. 614, Aug. 14, 1907.

Habitat: On soil over rocks.

The rocks were covered with silt from a glacial streamlet to the depth of about an inch, but in the summer time this was very dry.

University of Washington, Seattle, Wash.

ADDITIONS TO THE LICHEN-FLORA OF SOUTHERN CALIFORNIA

H. E. HASSE.

In this, as in a former paper (THE BRYOLOGIST, Nov. 1909), a terminology for the apothecial structures is adopted that has been proposed by Dr. O. V. Darbishire, now of Armstrong College, Newcastle-on-Tyne, England. (See Berichte d. Deutsch. Botan. Gesellschaft, 1898, XVI, Plate 1, and also Engler & Prantl, 1907, p. 41, Allgem. Theil by M. Fuenfstueck.) These terms vary but little from those in use, combining the differing terms of various authors used for the same structures, also possessing the merit of simplicity and of being clearly designative. They are:

Epithecium, the layer covering the disk.

Thecium, the structure consisting of the paraphyses and the spore-sacs.

Hypothecium, the layer on which the thecium rests.

Parathecium, the vertical, lateral continuation of the hypothecium, and forming a cup holding the epithecium and thecium.

Proper margin, is the rim of the cup, encircling the epithecium.

Thalline margin, that part, when present, of the thallus encircling the parathecium.

Amphithecium, the immediate continuation outward of the thalline margin, containing the gonidia and clothed by the cortex. The deeper structure continuing under the hypothecium is the *Medulla*.

PARMELIA MULTISPORUM Schneider, Guide, 1898, p. 154.—*Parmelia olivacea* var. *multisporum* Merrill, BRYOLOGIST, July, 1909.

The range of this lichen can now be extended south to the San Bernardino mountains, California. To the excellent description given by Mr. G. K. Merrill, I beg to add:—epithecium continuous, brown gradually paling downward; thecium colorless, 60μ to 64μ high, staining blue with iodine except the epithecium, which retains its natural color; paraphyses coherent; hypothecium colorless; asci inflated clavate; spores 16 to 24 in asci, ovoid, 8μ to 9μ long, 5μ to 8μ thick, or globular and 5μ to 8μ thick, the differing forms about equal in number. Not more than twenty-four spores were seen in specimens examined.

Aside from the smaller size of the thallus, it is externally quite similar to *Parmelia olivacea* (L.) Nyl. the marked feature of the spore character, however, seems to entitle it to the species rank of its author. The writer has seen it from the Santa Cruz mountains (A. C. Herre), San Bernardino mountains (S. B. Parish), and has collected it in the

Yosemite Valley on the smooth bark of oak branches, etc., also on twigs, dead and living, in the San Gabriel range, Los Angeles County.

THELOSCHISTES VILLOSUS (Ach.) Norm., on *Lycium Californicum* Nutt. and other shrubs at Point Loma near San Diego.

The apothecia are rare and the plant is smaller than the type from Lower California, where Mr. C. R. Orcutt collected it.

PLACOLECANIA CANDICANS (E. Fr.) A. Zahlbr., *Ascolichenes* in Engler & Prantl, 1907, p. 205. = *Lecanora candicans* Schaer.. Crombie Bi. Li. 1894, p. 390.

Thallus appressed, forming round patches, areolate-rimose in the center, or squamulose, the scales somewhat discrete roundish lobulated, at the circumference radiate, the radii also lobulated. KHO-. Apothecia sessile; disk dull brownish-black with a faint bloom and a turgid, finally crenulated thalline margin; epithecium grayish-brown, subcontinuous; thecium colorless, 96 μ to 102 μ high, with iodine deep blue; paraphyses coherent, strict, neither septate or forked; the tips slightly clavate and colored; hypothecium nearly colorless or with a faint yellowish tint: asci clavate; spores in 8s, oblong-ellipsoid, 11 μ to 17 μ long, 4 μ to 5 μ thick; spermatia staff shaped, 4 μ to 5 μ long, 1 μ thick; the gonidial layer is continuous under the hypothecium. On calcareous rock, Catalina Island.

Bacidia Clementis, Hasse sp. nov.

Thallus crustaceous, moderately thick, subdeterminate, whitish, coarsely granular and rugulose, becoming chinky, KHO-, Ca (Cl. O) 2-. Apothecia sessile, small, 0.2 to 0.8 mm. wide; disk primarily flat, brown-black, soon convex, the proper margin concolorous, soon obsolete; epithecium colorless, granulose; thecium colorless to pale brownish at the circumference; paraphyses not coherent, loosely intertwining, branched, not thickened nor colored at the tips; hypothecium yellowish-gray; asci clavate to subcylindric, 68 μ to 112 μ long, 12 μ to 16 μ thick, the membrane not at all or slightly thickened at the top in the larger asci; spores in 8s, cylindric, 60 μ to 80 μ long, 4 μ to 5 μ thick, both ends equally bluntly obtuse without attenuation, 15 to 17 locular, mostly once or twice gently curved; hym. gel. gives no reaction with iodine, only the asci becoming yellow, the escaped spores do not stain with the reagent; hypothecium brown, not changed with KHO; spermagones seen as minute black protrusions, sterigma straight, simple; spermatia acicular, straight or lightly curved, 10 μ to 12 μ long.

Collected at San Clemente on bark of *Heteromeles arbutifolia* Roem. by Bl. Trask. Since then I have found it on the same substrata in St. Ynez

cañon of the Santa Monica mountains. Type specimen deposited in the herbarium of the writer.

Haematomma Pacifica Hasse sp. nov.

Thallus white, effuse, finely granular, KHO+yellow, Ca (Cl. O)₂-; apothecia sessile, 1 to 1.5 mm. wide; disk reddish brown and blood red, flat to lightly convex, the proper margin concolorous; epithecium subcontinuous, red-brown to orange, this colored layer is from 50 μ to 52 μ high; thecium yellowish, 100 μ to 112 μ high (including the colored epithecium); paraphyses strict, slender, some are clavate above and faint orange; asci clavate, the membrane thin, extending up into the epithecium; spores in 8s; acicular-fusiform, 36 μ to 56 μ long, 3.5 μ to 4 μ thick, straight or slightly curved, 5 locular, arranged longitudinally parallel in the ascus, about the upper half of the spore, containing the septa, is of the given thickness, the rest is acicular attenuated; hypothecium about 100 μ high, yellow, of darker hue than the epithecium; the white, thin thalline margin contains a few gonidia; asci clavate, reaching the epithecium, thin walled; iodine stains the hym. gel. deep indigo blue, KHO gives a handsome purple violet stain. Spermatogones not seen.

On back of *Pseudosuga macrocarpa* Mayr. Santa Cruz mountains (A. C. Herre), and on the same substrata in the San Gabriel mountains, Los Angeles County, at from 800 to 1500 m. alt. This lichen has been called "off hand" by me (a reprehensible proceeding) *Lecanora elatina* Ach., and distributed erroneously as such. It differs from the eastern *L. elatina* in its finer granular thallus, darker blood-red disk, the spores and the marked reaction.

BLASTENIA FERRUGINEA (Huds.) Arn. var. FRAUDENS Th. Fr., Lich. Sand. 1871, p. 184.

Thallus white, thin, effuse or absent, KHO+ gradually crimson, staining slower than the disk; apothecia sessile, crowded, small, 0.25 to 1.25 mm. wide; disk pale orange and yellowish orange, flat to convex, the proper margin paler, thin, entire and finally obsolete; disk and margins with KHO+crimson; epithecium granulose, pale yellow; thecium colorless, 56 μ to 60 μ high, blue with iodine, epithecium also; paraphyses loose, straight and comparatively stout, some with globular, pale yellow heads, others are barely thickened at the colorless tips; hypothecium colorless; asci clavate; spores in 8s, oblong ellipsoid, 11 μ to 15 μ long, 3 μ to 5 μ thick; bilocular and polar-bilocular, the loculi approximate, isthmus faint or doubtful; thecium and epithecium with KHO+crimson.

On bleached whalebones, San Clemente Island (Bl. Trask), also on arinaceous shale at White Point near San Pedro.

Sawtelle, California.

ADDITIONAL LOCALITIES FOR CONNECTICUT HEPATICAE.

JOHN L. SHELDON.

An examination of "The Bryophytes of Connecticut," by Evans & Nichols, shows that there have been but few species reported from the eastern part of the State, more especially from those townships bordering on Rhode Island.

It has been my good fortune to visit the townships of Plainfield, Sterling and Voluntown occasionally for a number of years and to collect along with other plants, a few liverworts, mosses and lichens. A report on the mosses and lichens will be reserved for a future paper. The following are the liverworts, the determination of which, for the most part, have been verified by either Miss C. C. Haynes or Dr. A. W. Evans. Duplicates of most of them have been placed in the herbaria of the Sullivant Moss Society and Yale University.

Anthoceros laevis L. Central Village. Around springy places in woods.

Anthoceros punctatus L. Wauregan depot. In gutter along roadside.

Blasia pusilla L. Moosup and Moosup Pond. In gutter along roadside and at edge of small stream crossed by road.

Calyptogeia Trichomanis (L.) Corda. Wauregan depot. On earth in swampy pasture. Moosup Pond. Bank along roadside.

Cephalozia connivens (Dicks.) Lindb. Wauregan depot. On earth in pasture. In tamarack swamp northeast of Wauregan.

Cephalozia lunulifolia Dumort. In tamarack swamp northeast of Wauregan.

Chilocyphus polyanthus (L.) Corda. On rocks in brook northeast of Wauregan.

Conocephalum conicum (L.) Dumort. Central Village and Moosup. Along banks of small streams.

Frullania Asagrayana Mont. Central Village. On rock in woods.

Frullania eboracensis Gottsche. Sterling. On an apple tree. Central Village. On barks of various trees.

Nardia crenulata (Sm.) Lindb. Voluntown. On bank and in gutter by roadside.

Odontoschisma prostratum (Sw.) Trevis. Central Village. Among mosses.

Pallavicinia Lyellii (Hook.) S. F. Gray. In tamarack swamp northeast of Wauregan.

Pellia epiphylla (L.) Corda. Central Village. Along bank of small stream. Voluntown. On bank by roadside.

Porella platyphylla (L.) Lindb. Central Village. On rocks, trees, and stones at edge of small stream.

Ptilidium pulcherrimum (Web.) Hampe. Voluntown. On rock and trunk of white pine. Moosup Pond. On stone in wall.

Riccia sorocarpa Bisch. On sand along river bank near the junction of the Moosup and Quinnebaug rivers. Very abundant and growing with *Ricciocarpus natans*. Dr. Evans says "This species is not listed in our catalogue of Connecticut bryophytes, but Mr. Nichols discovered it in two localities near New Haven, late in 1909. Your discovery, however, antedates his."

Ricciocarpus natans (L.) Corda. Referred to above.

Specimens of *Ricciaceae* have been collected many times, but they have either been so small or few that the species could not be satisfactorily determined. *Ricciella fluitans* was probably among those collected at Central Village and near the Wauregan depot.

Scapania nemorosa (L.) Dumort. Central Village. Among mosses on earth.

West Virginia University, Morgantown, W. Va.

ADDITIONAL WEST VIRGINIA HEPATICAE.

JOHN L. SHELDON.

Since the publication of a previous report (BRY. X: 5, 1907) on the West Virginia Hepaticae, the range has been considerably extended for many of the species listed at that time, and a number of species not listed then have been collected. One of the richest localities visited was on a north slope along the Greenbrier River, opposite Durbin. Here eighteen species were collected in a narrow strip while waiting for a train, three of the species not having been previously reported for the State. The following are the species not reported in the former list. Dr. Evans and Miss Haynes have given valuable assistance in determining or verifying some of the doubtful species.

CHEILOLEJEUNEA PHYLLOBOLA? (Nees & Mont.) Schiffn. On sweet birch near Cooper's Rock, Monongalia County (3022).

CHILOCYPHUS PALLESCENS (Ehrh.) Dumort. On decaying log, Albright, Preston County (3373).

CHILOCYPHUS POLYANTHUS (L.) Corda. On decaying leaves and grass, Cranberry Glades, Pocahontas County (3846). On decaying log, Durbin, Pocahontas County (3766).

COLOLEJEUNEA BIDDLECOMIAE (Aust.) Evans. On ledge, Sturgisson, Monongalia County (3282). On decaying log, Cranesville, Preston County (3426).

FOSSOMBRONIA WONDRAZCEKII (Corda) Dumort. On earth, Morgantown (2764, 3190, 3919). Number 2764 was reported as *F. foveolata* in the former list.

FRULLANIA RIPARIA Hampe. On trunk of sugar maple, Lick Run, Monongalia County (2983).

HARPALEJEUNEA OVATA (Hook.) Schiffn. On stone at edge of brook, near Oliver, Monongalia County (2916). On trunk of sycamore growing in Quarry Run, Monongalia County (3021).

JUNGERMANNIA PUMILA With. On log in river, Durbin (3788).

LEPIDOZIA REPTANS (L.) Dumort. Growing with *Scapania nemorosa* on earth, Durbin (3779).

LOPHOCOLEA MINOR Nees. On rocks and earth, Ceredo, Wayne County (3895).

LOPHOZIA VENTRICOSA (Dicks.) Dumort. On ledge, near Cooper's Rock (3024).

METZGERIA CRASSIPILIS (Lindb.) Evans. On various tree trunks, Warn-town (3641), Seebert (3619), Cranberry Glades (3694), Pocahontas County.

NOTOTHYLAS ORBICULARIS (Schwein.) Sull. Edge of small pond and stream, Morgantown (3518 3921). Along banks of Ohio River. Moundsville, Marshall County (3888). Sandy soil along edge of brook, Ceredo (3900).

PALLAVICINIA LYELLII (Hook.) S. F. Gray. On earth and logs among mosses, Cranesville (3484).

PELLIA FABRONIANA Raddi. Along bank of small stream, Ceredo (3899).

?REBOULIA sterile. On earth and rock, Warntown (3631).

RICCIELLA FLUITANS (L.) A. Br. Sandy soil along edge of brook, Ceredo (3897). Edge of small pond, Morgantown (3928).

SPHENOLOBUS HELLERIANUS (Nees) Steph. On decaying log, Cranberry Glades (3688).

SPHENOLOBUS MINUTUS (Crantz) Steph. On ledge near Cooper's Rock (3023).

West Virginia University, Morgantown, W. Va.

CHARLES REID BARNES.

MARSHALL A. HOWE.

American bryologists were shocked recently to learn of the sudden death of Professor Charles Reid Barnes, which occurred in Chicago on February 24, as a result of a fall on an icy sidewalk. Professor Barnes was born in Madison, Indiana, September 7, 1858, and was, accordingly, in the fifty-second year of his age. He was graduated from Hanover College in 1877 and afterwards, on several occasions, was in residence at Cambridge, Massachusetts, in order to carry on botanical researches at Harvard University. From 1880 to 1887, he was instructor and professor in natural science lines in Purdue University at Lafayette, Indiana, resigning in the latter year to accept the professorship of botany in the University of Wisconsin, which important position he held until 1898, when he became professor of plant physiology in the University of Chicago. Professor Barnes had been one of the editors of the *Botanical Gazette* since 1883 and had played an important part in the development of that influential and efficient periodical. In 1886 the "Handbook of Plant Dissection," by Arthur, Barnes, and Coulter was published. This, in its day, was widely used as a laboratory manual, and together with Professor Bessey's well-known botanical textbooks, helped to usher in a new era in botanical instruction in American high schools and colleges—one in which the emphasis fell upon anatomy and morphology rather than upon herborizing and classification. Although Professor Barnes early evinced an interest in the physiology of plants, and although during his later years his published papers are mostly along this line, his earlier researches were largely in systematic lines and related particularly to the mosses. It is probable that the wide first-hand knowledge of plants that he thus acquired in field and herbarium contributed appreciably to the accuracy of his later work in other phases of botanical science. Following is a list—doubtless incomplete—of his bryological papers:

Analytic key to the genera of mosses, recognized in Lesquereux and James's

Manual of the mosses of North America. Purdue Univ. Sci. Bull. no.

I: 1-12. 1886.

Revision of the North American species of Fissidens. I. Bot. Gaz. **12**: 1-8.

Ja 1887; II. Bot. Gaz. **12**: 25-32. F—1887.

Revision of N. Am. species of Fissidens. Bot. Gaz. **13**: 99. Ap 1888.

Notes on North American mosses. I. Bot. Gaz. **14**: 44, 45. F—1889; II. Bot.

Gaz. **16**: 205-207. Jl 1891.

Leo Lesquereux. Bot. Gaz. **15**: 16-19. Ja 1890.

Artificial keys to the genera and species of mosses recognized in Lesquereux and James's Manual of the mosses of North America. Trans. Wisconsin Acad. Sci. **8**: 11-81. 1890.

Artificial keys to the genera and species of mosses recognized in Lesquereux and James's Manual of the mosses of North America—Additions and corrections. Trans. Wisconsin Acad. Sci. **8**: 163-166. 1890.

Analytic keys to the genera and species of North American mosses. (Revised and extended by Fred De Forest Heald, with the cooperation of the author). Bull. Univ. of Wisconsin, Science Series **1**: i-x. + 157-368. "December, 1896." [1897].

In 1898, Professor Barnes published a botanical textbook of 428 pages under the title of "Plant life considered with special reference to form and function." An abridged and simplified edition of this work, with the title "Outlines of plant life with special reference to form and function," appeared two years later.

He was the author, also, of numerous scholarly papers relating to the physiology of plants and of many critical reviews. His reviews were occasionally a little caustic, but his opinions were always interesting and stimulating.

Dr. Barnes was active in the American Association for the Advancement of Science, having been secretary of Section G in 1894, secretary of the Council in 1895, general secretary in 1896, and vice-president (chairman of Section G) in 1899. He was one of the founders of the Botanical Society of America, its secretary from 1894 to 1898, and its president in 1903. Though Professor Barnes was still in the prime of vigorous manhood, he was generally looked upon as belonging to the older circle of American botanists—a feeling that was due less to his years than to his long-established position among the leaders. His was a personality that American botany could ill afford to lose. And, indeed, it is not lost, for its influence still endures.

New York Botanical Garden.

SULLIVANT MOSS SOCIETY NOTES.

New Members.—Since the March number was issued we list the following: No. 204 Mr. Harvey Bassler, E. M., Albright College, Myerstown, Lebanon Co., Pa. No. 205. Rev. David Lillie, D D., The Manse, Watten, Caithness, Scotland. No. 206. Mr. Frank Dobbin, P. O. Box 197, Shushan, New York.

The last name given in the March number at bottom of page 46, should be spelled Györrffy. Also in the January list it should be Mr. Eikichi Iishiba.

OFFERINGS.

(To Society Members only. — For postage.)

- Mr. Edward B. Chamberlain, 38 West 59th Street, New York City. *Sphagnum papillosum* Lindb. Collected in Finland by Dr. Brotherus; *Haplohymenium triste* Kindb. (= *Leskea tristis* Caess.) st. Collected in Japan by Prof. Iishiba; *Bissetia lingulata* (Mitt.) Broth. st. Collected in Japan by Prof. Okamura.
- Rev. James Hansen, St. John's University, Collegeville. Minnesota. *Brachythecium acuminatum* (Hedw.) Kindb.; *B. rivulare* B. & S.
- Dr. H. S. Jewett, 15 West Monument Ave., Dayton, Ohio. *Hedwigia ciliata* Ehrh. Collected in Dayton.
- Mr. D. Lewis Dutton, R. F. D. 2, Brandon, Vermont. *Anomodon rostratus* Schimp.; *Dicranella heteromalla* Schimp.
- Prof. T. A. Bonser, Spokane College, Spokane, Wash. *Scouleria marginata* E. G. Britton.
- Prof. J. B. Flett, 107 North Tacoma Ave., Tacoma, Wash. *Alsia abietina* Sulliv.; *Hypnum robustum* Hook.
- Mr. R. S. Williams, New York Botanical Garden, New York *Mnium Blytii* B. & S.
- Mr. George B. Kaiser, 524 Locust Ave., Germantown, Pa. *Thelia Lescurii* Sulliv.; *Ditrichum tortile* (Schrad.) Hampe; *Eurynchium strigosum* (Hoffm.) B. & S.
- Dr. J. F. Brenckle, Kulm, North Dakota. *Lecanora erysibe* (Ach.) Nyl. Collected in North Dakota.
- Mrs. Byron C. Leavitt, Millbrook, Mass. *Baeomyces roseus* Pers.; *Cladonia uncialis* (L.) Web. Collected in Mass.
- Miss Mary F. Miller, Lyonhurst, R. F. D. 4, Washington, D. C. *Physcia tribacia* (Ach.) Tuckerm.; *Cladonia capillaria molariformis* (Hoffm.) Schaer. Collected in Virginia.

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NUMBER 4



JULY 1910



THE BRYOLOGIST

AN ILLUSTRATED BIMONTHLY DEVOTED TO
NORTH AMERICAN MOSSES

HEPATICS AND LICHENS

FOUNDED IN 1898

By

ABEL JOEL GROUT, Ph.D.

EDITOR

ANNIE MORRILL SMITH

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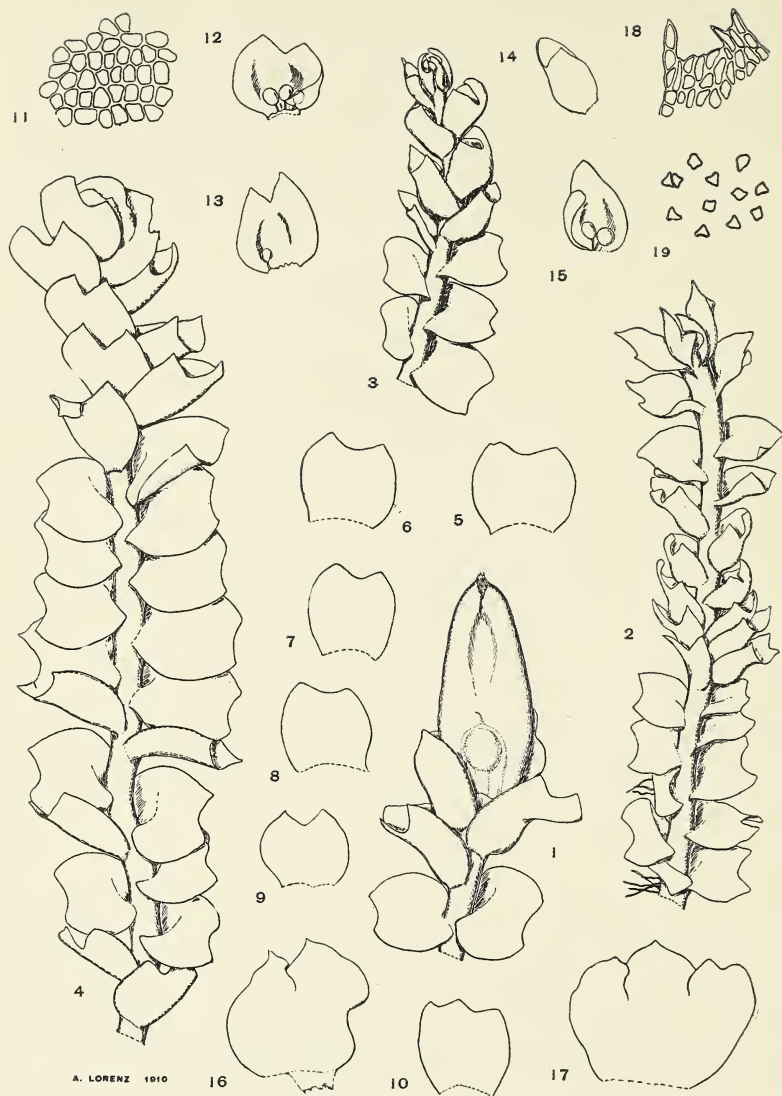


PLATE VIII. *Lophozia alpestris*

THE BRYOLOGIST

VOL. XIII

JULY 1910

No. 4

NOTES ON *LOPHOZIA ALPESTRIS* (SCHLEICH.) EVANS

ANNIE LORENZ

In THE BRYOLOGIST for March, 1910, the writer discusses "Some Lophozias of the Ventricosa-group" and one of these species, *Lophozia confertifolia* Schiffner approaches *Lophozia alpestris* (Schleich.) Evans, the subject of the present notes. The former, however, is of a more delicate texture, has larger leaf-cells with more delicate walls, and the American specimens so far collected have been sterile. Also it is a bluer-green in color; and the shallow sinus with unequal, frequently obtuse leaf-tips is very similar in the two species, except that it is more uniform in *Lophozia confertifolia*.

Lophozia alpestris, especially in some of its larger forms, might be confused with *Lophozia ventricosa* (Dicks.) Dum. but it has two individual characters. According to Dr. Evans, the smaller leaf-cells, 18μ instead of 23μ , and Gottsche points out the diversity of the sinus of the leaves on the same stem. It is a species of subalpine and alpine regions, taking the place of *Lophozia ventricosa* in the higher altitudes. Bernet says "it is common on bare siliceous ground on all the range of Mt. Blanc, replacing the *Lophozia Muelleri* (Nees) Dum. of the calcareous Jura and Bernese Oberland. It is polymorphous, as the great number of synonyms attests."

In New England it has been reported from Maine, New Hampshire, and Vermont, being fairly common in the White Mountains, although not ubiquitous, like *Lophozia attenuata* (Mart.) Dum. Macoun¹ gives various Greenland and Canadian stations. Dr. Evans, in Collins' report of the Katahdin mosses, Rhodora III, p. 181, 1901, first puts it into *Lophozia*.

Kaalaas² says "well distributed over all the mountainous parts of Norway—always on a siliceous substratum—varies most markedly in habit, color, size and leaf-form, especially specimens from lower-lying stations seem to approach *Lophozia ventricosa*. Fertile specimens are on the whole collected seldom; yet seem in certain mountain sections to be somewhat common, but the majority of tufts are of male plants only."

The conditions are similar at Waterville, N. H. It grows on damp ground, either in pure stands or mixed with other mosses, while typical

¹ Macoun, Cat. Can. Plants VII, p. 17 (1902).

² Kaalaas, De Distr. Hep. in Norv. p. 335. 1893.

Lophozia ventricosa grows on rocks in damp places, often on a perpendicular surface, should be dark-green, and the sterile tufts are flattened; while *Lophozia alpestris* ranges from green in the shade to being usually considerably pigmented with brown, where at all exposed to the sun. Theoretically, it does not like to live in the woods, but prefers open country.

Specimens from the south side of the "V" at Waterville, 2500 ft. alt., with only afternoon sun, grew on damp granite slopes, mixed with *Jungermannia sphaerocarpa* Hook. and *Marsupella emarginata* (Ehrh.) Dum. and bore abundant ♂ spikes.

Large brown plants from West Branch, near Osceola Camp, 1800 ft. alt., bore perianths with almost mature capsules, they were twice the size of the plants from the "V," and probably approach var. a. *latior* of Nees.¹

The species is dioicous. Warnstorf² says "Antheridia united into short, almost cone-like terminal spikes," but they are intercalary; there are five or six pairs of bracts, containing 1-3, usually two, large, watery-green antheridia.

Nees devotes many pages to this species, and describes sixteen varieties. According to Limpricht, however "his *Jungermannia sicca* is the ♂ plant of *Lophozia alpestris*, and could only at such a time be considered as a separate species, when the greatest weight was laid upon the presence of underleaves."

Nees says "very rarely, and only in its larger forms, does it develop fruit. One finds perianths and capsules in late autumn and early in spring, after the snow has melted. The outline of the leaves is roundish-ovate ranging toward quadrate and very unequal. The dorsal or hinder edge is straighter, only rarely curving forward somewhat toward the base, the ventral or forward edge forms on the contrary always a stronger curve, which however soon flattens out more or less, only rarely are all the leaves flat, usually their outer sides are strongly arched, the inner hollow, and then they are tilted obliquely forward and up, while the flatter leaves are spread out more sidewise. The tips, bending toward each other, quickly upon the beginning of drying bend inward more and more tensely, whereby this species makes itself particularly easily recognizable.

The leaves are quite stiff, thickish, smooth and shining, with a fatty shine, their color ranges from a fresh youthful green quite soon into a pale, yet more commonly into a reddish-yellow, from this into a dull red-brown and blackish-brown, and these colors, in most plants of this species, flow

1. Nees. Naturges. der Em. Leberm. II p. 109, 1838.

2. Warnstorf. Kryptogamenfl. der Mark Brandenb. p. 182. 1903.

into one another through many gradations. Also an agreeable blood-red shade occurs.

The fruit appears on the ends of the stems, where it often remains undeveloped. It comes, however, in respect to its structure and development, nearest to *Jungermannia ventricosa*. One chief difference lies, to be sure, in the structure of the perianth, which in *J. alpestris* is longish, almost cylindrical, without keels, obtuse, while in *J. ventricosa* it is short, swollen, plicate above, and with sharply toothed mouth.

Remarks on the differences of the two species.

Remark 2. The hollow form of the leaves on the fruit-bearing stem, while on the fertile *Jungermannia ventricosa* they stand out flat.

Remark 4. *Jungermannia ventricosa* is almost always grass-green.

Remark 6. The brown, not yellow gemmae of the ♂ plant, which otherwise resembles *Jungermannia ventricosa*."

Stephani ¹ refers to it as follows: "Leaves extraordinarily different in form, as broad at the apex as at the base, yet also often narrower, tips acute and unequal, somewhat bent inward; the leaves on one and the same stem hardly resemble each other in form, and from this the plant is easily recognizable. One of the species that is oftenest confused."

However, its identification should offer but little difficulty after reference to the above-mentioned peculiarities, and it may even penetrate as far south as Mt. Greylock, Mass.

EXPLANATION OF PLATE VIII.

LOPHOZIA ALPESTRIS (SCHLEICH.) EVANS

1. Branch with perianth, antical view, $\times 87$.
2. Branch with ♂ inflorescence, antical view, $\times 87$.
3. Young ♂ inflorescence, $\times 87$.
4. Sterile branch, $\times 87$.
- 5, 6, 7, 8, 9, 10. Leaves, $\times 87$.
11. Cells from middle of leaf, $\times 430$.
- 12, 13, 14, 15. Perigonial bracts, $\times 87$.
- 16, 17. Perichaetial bracts, $\times 87$.
18. Teeth from mouth of perianth, $\times 430$.
19. Gemmae, $\times 430$.
- . All reduced to two-fifths.

The figures were all drawn by the writer, nos. 5, 6, 7, 8, 9, 10, 11, from specimens collected by Dr. Evans on Mt. Washington, N. H.; the remainder from specimens collected by the writer at Waterville, N. H.

Hartford, Conn.

1. Stephani. Deutsch. Jung. p. 34. 1879.



FIG. 1.

FIVE COMMON CEPHALOZIAS.

HELEN E. GREENWOOD.

Since the identification of the different species of the genus *Cephalozia* sometimes presents difficulties to the student beginning the study of Hepatics, the accompanying photo-micrographs¹ have been made to bring out by comparison the more striking characteristics of each species, especially in regard to shape of leaves, and their method of attachment to the stem. Only the more common forms, those that may be found on every collecting trip, have been figured here.

The Cephalozias are characterized by their small size, delicate structure, the tiny plants having leafy stems, the leaves being more or less round-ovate in shape, and being two-lobed or deeply cleft from one-fourth to one-half their length. They may be found on shaded banks, on damp soil, decaying wood, swampy ground, or growing over mosses or other hepatics.

¹ These photo-micrographs were taken by the writer in the Biological Laboratory of Clark University, through the courtesy of Dr. C. F. Hodge, Professor of Biology.



FIG. 2.

For classification they seem to fall naturally into two main divisions, those having decurrent leaves (the leaf tissue extending down the stem below the place of attachment), and those whose leaves are not decurrent.

Of the latter class, leaves *not* decurrent, *Cephalozia bicuspidata* (L.) Dumort., (Figures 1 and 2,) is perhaps the most common species. The plants are either prostrate or ascending, bright green in color, and form a thick mat over damp soil in shaded places, or grow over other hepatics and mosses. The leaves are round-ovate, deeply cleft nearly to the middle, the lobes being straight and scarcely connivent, the lower lobe tending to be narrower than the upper, both lobes being acute. The lower leaves are somewhat smaller and more distant than the upper ones. (Fig. 2.) The natural tendency of the leaves is to fold together along the stem. (Fig. 2.)

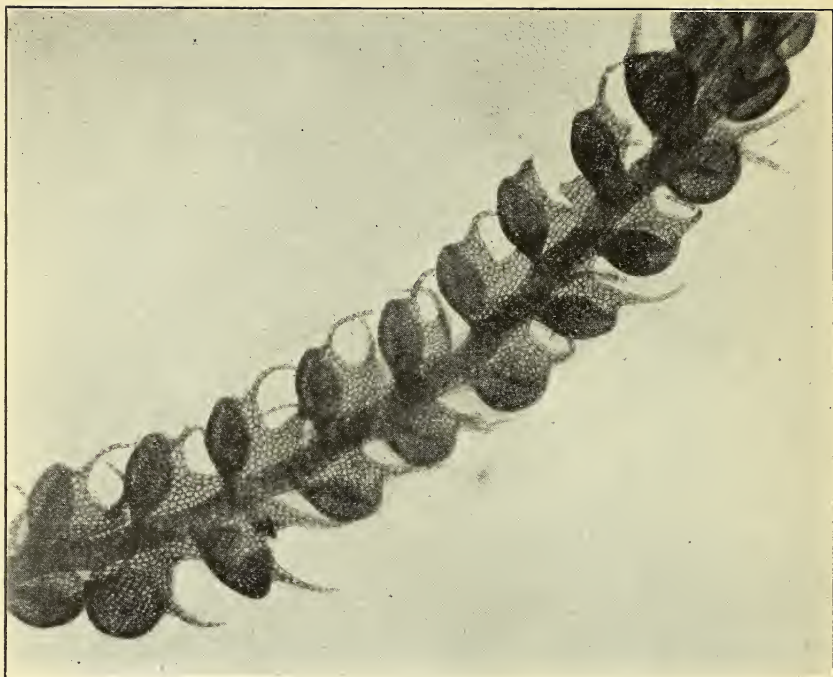
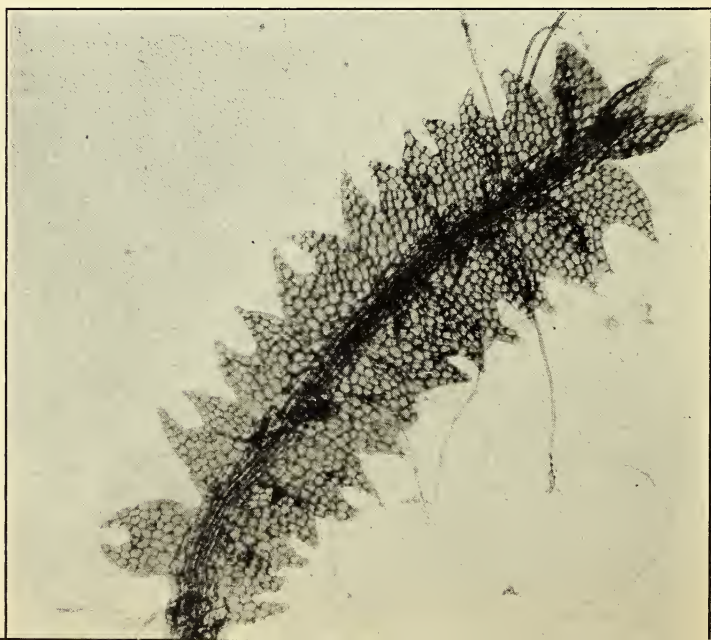


FIG. 3.



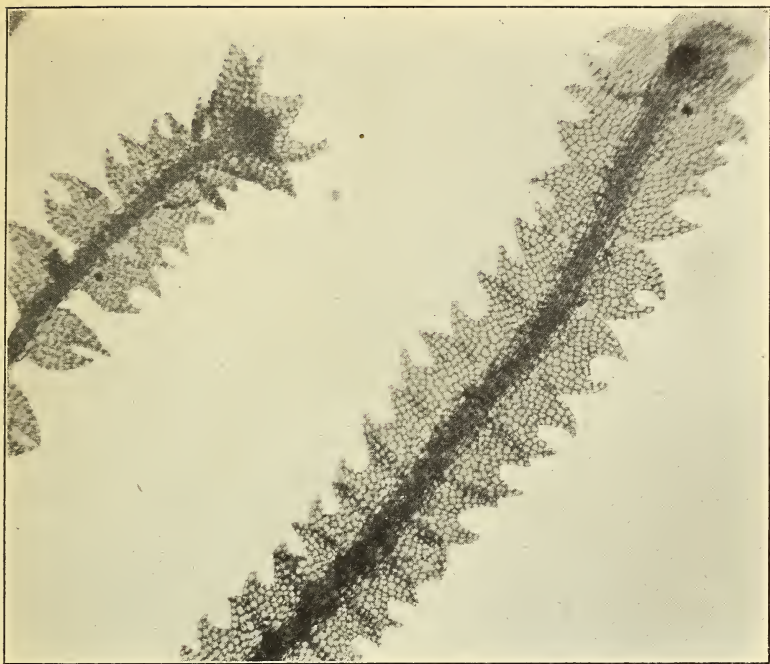


FIG. 5.

Cephalozia curvifolia Dumort., (Fig. 3.) can usually be distinguished without a lens for the leaves seem to surround the stem rather than to grow out horizontally. The plants are generally found on decaying logs in swamps, and have a greenish to a reddish or brownish color. The leaves are concave, the lower portion folding back upon the upper, seeming to form a kind of sac. The leaves are cleft to the middle or below the lobes, ending in long slender incurved points or hooks. The cells are small and quadrate in shape.

Of the species having *decurrent* leaves, *Cephalozia connivens* (Dicks.) Lindb., (Fig. 4,) shows the least tendency in that direction. These plants may be found in wet swampy land, and can be readily identified by the large size of the leaf cells. The leaves are much more rounded in shape than those of the other species. They are not deeply cleft, the more or less connivent lobes being bordered by a row of cells of uniform size and shape.



FIG. 6.

Cephalozia serriflora Lindb. and *Cephalozia lunulaefolia* Dumort. have distinctly decurrent leaves, the distinguishing points of difference between the two being the following: In *Cephalozia serriflora* (Fig. 5,) which grows on swampy ground or rotten wood, the leaves are rounded in shape and grow out horizontally or at right angles from the stem. They are cleft nearly to the middle, the points of the lobes being acute and more or less connivent.

In *Cephalozia lunulaefolia* (Fig. 6,) growing on shaded banks and rotten logs, the leaves are small, light green in color, and slant obliquely upward from the stem. They are round in shape being bifid only one-third of their length, the cleft being much rounded out so that the connivent points of the lobes tend to meet like a pair of calipers. The plants are of very delicate structure.

Worcester, Mass.

THE TYPICAL FORM AND THE SERIES OF FORMS

PROFESSOR DR. JULIUS RÖLL

Under the title "Artentypen und Formenreihen bei den Torfmoosen" I published in 1888 an article in No. 22-26 of the *Botanical Centralblatt*. An article by Mr. LeRoy Andrews of Ithaca, New York, published under the title "Dr. Röhl's Proposals for the Nomenclature of Sphagnum" in *THE BRYOLOGIST*, Vol. XIII, January, 1910, makes it necessary for me to refer to the afore mentioned article.

I have not created a new *system* of Sphagnology as he supposes, but have merely recommended a new *method* of enquiry into the science, a method which I have applied in my publication "Zur Systematik der Torfmoose" (1886) which instead of describing types of species (Artentypen), puts a series of forms (Formenreihen) together and describes them. I hold that as the Sphagna are particularly fertile in producing new forms it is advisable to observe and investigate these forms as a series, rather than according to the older method which presupposes, or chooses, one constant central point, taking some arbitrary specimen from a herbarium as a basis. Certainly we are faced here by two methods, the old method, which first describes the type and then seeks the related forms, and the new method, which lays greater stress on investigation of forms as they appear in nature, and which arranges these forms in series according to their common attributes and their respective affinities.

Constant investigation and discovery of new forms and the placing of such in their respective series works towards an ever increasing perfection of series but of course, according to this method the typical form becomes a moveable point, so that its determination is of decreasing value. But I have never denied the binomial character of my series of forms (Formenreihen). I have always given them the usual two names, the generic name and the name of the species and any one is welcome as far as I am concerned to consider any form as *forma typica*.

It is a fact to be taken into account that the new method is being used more and more for genera and species so rich in forms as *Brya*, and *Harpidia* (*Drepanocladus*), for *Cirsium*, *Hieracium*, *Viola*, *Rosa*, *Rubus*, *Salix*, as in Zoology. This agrees with the principles of the theory of evolution.

I have also protested against the renaming of the species and of my series of forms and their varieties and kinds, as being against the International Rules of Botany. Neither is it credible that by merely renaming a

series of forms a central point can be created and become binomial, or that a variety or form can be created a *forma typica* thereby.

Mr. Andrews objects to my rule that the definition (Diagnose) of a series of forms (Formenreihe) must be short. If it be grounded only on one form as e. g. *Sphagnum rubellum* Wils., one of the red *acutifolia* forms, as many Warnstorf species are based on one specimen, then the diagnosis must naturally be far reaching. Should, however, several forms be united in one series of forms (Formenreihe) the contents of the conception are enlarged, then the definition must logically be abridged. If therefore there should be added to the original *Sphagnum rubellum* Wils., which exists only in the red variety, green, yellow and pale forms, the attribute "red" is out of place and must be applied only to the particular variety. It is the same with the other differentiating attributes. The more varieties a "Formenreihe" has, or receives in course of time, the more do its characteristic attributes shrink, the simpler and shorter will the definition of the Formenreihe be. On the whole the capacity and extent of an idea stand in inverse ratio, or in other words the wider and larger its capacity the narrower and smaller is the extent of the diagnosis.

I should not mention this well-known fact, if Mr. Andrews in ignoring this did not find in the short diagnosis of a long Formenreihe "an incomplete description," and make it seem responsible for the difficulty of bringing single forms together in their proper places. This difficulty really exists. The cause, however, does not lie in the shortness of the diagnosis, but in Nature. A wide-reaching definition makes no alteration in this. It would on the contrary make the classification even more difficult. For when one also includes in this definition the characteristics of the forms which do not belong to them, we get such expressions as: mostly, often, generally, here and there, now and then, seldom, and others which make a definition both confused, uncertain and impractical. In this way definitions would be no diagnosis of species, but remain diagnosis of forms.

The adherents of the old method ignore the intermediate forms which are difficult to classify, the followers of the new method devote their attention to just these forms; they try to connect and not to separate species in their investigation of *Sphagnum*. They do not rest satisfied with the definition of species, they do not allow a system to limit enquiry, they attempt to translate Nature's language by dint of close observation. To throw overboard transitory forms is a mistake easily explained by motives of convenience, but the adherents of this method ignore such forms from a desire to deny an a priori species; in fact they seem to regard connecting forms as

pernicious members of the chain of beings because they depreciate the value of the constant species and diminish the splendour of the *forma typica*; this is more than a blunder, it is an injustice to Nature.

The new method of sphagnological investigation requires microscopical study of the numerous forms as well as observation of the various circumstances under which such forms are produced. Their great variety, their rich natural life, their development, their growth, their manifold variation in size, form and color, both in water and on land, in light and shade, their adaptability to the nature of the ground, their dependence in geographical position, on climate and on other meteorological factors as well as on plants which grow in their neighborhood (mimicry), their common and differentiating characteristics—all these facts must be studied before we venture to place them in their correct series of forms. The *Sphagna* are distinguished in the above mentioned way from many other groups of plants less rich in variety, but I do not say that the new method of investigation should be limited to inquiry into *Sphagna*.

It seems to me bad logic for Mr. Andrews to express hope that Warnstorf in his forthcoming work "*Sphagnum Universalis*" will present *Formenreihen* rich in contents based on single specimens taken from a herbarium. Apart from the fact that this is the wrong way to form a perfect *Formenreihe* and that not every plant specimen is a priori a *forma typica*, it is impossible for one man to carry out the work. The formation of a single *Formenreihe* demands years of study.

It appears to me that in consequence of the great wealth of variety in *Sphagna* forms and the hitherto defective exploration of swamps that the publication of a "*Sphagnologia Universalis*" is premature. In spite of this opinion we of course do not depreciate the value of such a work; we are grateful to its author especially when he in justice to the labors of others does not ignore nor rename their *Formenreihe* and forms, but respects the demands of the International Botanical Rules. We neither depreciate the work of the adherents of the old method nor the value of their method particularly in comprehensive compilatory works.

Such critical remarks as I make in my proposals to the International Botanical Congress in Brussels are only made with a view to clear away hindrances to common action. Warnstorf has already made a beginning in this direction. He writes in the "*Verhandlungen des botan. Ver. d. Prov. Brandenburg*," 1907, p. 182, "*Sphagnum plumulosum* Röhl, which name I now accept without reserve."

My ideas of "*Formenreihen*" of the *Sphagnum* based upon my experiences in European swamps was confirmed twenty-two years ago by my experience in the swamps of North America. I conclude with the sincere hope that others may carry on and control the studies then made. This is a task more profitable than slighting varieties and forms, and defending constant species and their typical forms.

Darmstadt, Germany.

THE TREATMENT OF LICHENS IN "THE GENERA OF FUNGI."

BRUCE FINK.

Dr. Clements' volume "The Genera of Fungi"¹ is well known to mycologists, but little has been stated regarding the treatment of lichens in this work. Though few botanists favor the distribution of lichens made by Dr. Clements, excluding the class *Lichenes*, this disposition is the only one that seems consistent with the principles of classification. While this is true, the present writer finds a number of particulars in which the lichens seem to him at least to have fared badly. He confesses being startled at the large number of new genera proposed in a disposition of lichens which, though original in some respects, is nevertheless mainly based upon the work of another man. Extensive genus or species making among lichens should rest upon great knowledge of these plants, which cannot be acquired in a few years. The systematic work of Nylander, Müller, and others during the last half century makes the acquisition of a good knowledge of lichen genera and species one fraught with an amount of labor which is fully appreciated only after many years of study of these plants, and the literature pertaining to them.

Most of Dr. Clements' new genera appear good enough, but who knows that they have not appeared previously under some other name, or who would dare to pass upon them without such exhaustive study as no man can make, covering the whole range of lichen genera? Making a large number of new genera, without apparent possibility of adequate first hand knowledge of all of the plants or the extensive literature involved, appears to be a procedure of doubtful merit. Seeing the need of new genera is by no means sufficient reason for making them. We are not told of more than one species for any of the sixty and more new genera, and in three instances, viz. the genera *Phaeoglaena*, *Diphyrgis* and *Ocellis*, the writer has not been able to discover even a type species. Examination of the work of Dr. Zahlbruckner, in Engler and Prantl, disclosed the fact that the diagnostic characters there given furnish the basis for the three genera named above, but the making of new genera on this basis appears like a merely literary performance, even if genera without cited species are valid, which is questionable.

Each new genus rests upon two or three diagnostic words found in the list of new genera and whatever one may find of diagnostic value in the portion of the keys where the new genus is proposed. This treatment will

¹ Clements, F. E. The Genera of Fungi. 1-227. Minneapolis. The H. W. Wilson Company, 1909.

stand the test of validity, but it is so brief and uncertain that one can hardly regard it satisfactory. Several new genera are placed under the *Lecideaceae* on page 77 and under the *Peltophoraceae* on page 174. The omission of the former family on the latter page is of course an oversight.

While holding the opinion that the lichen is a fungus, Dr. Clements seems to have based the genera *Chloropeltis*, *Cyanobaeis* and *Cystolobis* upon characters of the algae in relationship with which the lichens involved grow. This appears hardly consistent, since he points out no morphological differentiation of each genus due to the host. *Chloropeltis* replaces *Peltidea* without any explanation, and whatever name is used, the genus should rest upon the peculiarities in development of the apothecium as worked out by Fünfstück,¹ not upon the algae.

Changes in form of names of lichen genera, fortunately are not numerous. *Peltigera* is changed to *Peltophora* and *Peltigeraceae* to *Peltophoraceae* for reasons that are not stated, but which may appear in a careful study of the origin of the names. The *on* endings are all changed to *um*, which is better form, though there is doubt whether the change from the original form is warranted. *Theloschistes* is retained, though the original *Teloschistes* is correct and expresses exactly a diagnostic character of the genus not expressed by *Theloschistes*, which has a quite different meaning.

The writer can not pass minutely upon the merits of the portions of the keys dealing with lichens, for he has had no occasion to put them to severe test himself or in the hands of students. However, in the nature of the case, being based upon the recent work of Dr. Zahlbruckner, they should be better than portions based upon Saccardo. In general they appear good with such examination as could be made by running through them somewhat carefully.

The expression "parasitic on algae" is commonly used in the keys and is misleading in a number of ways. Dr. Clements gives no definition of the term "parasitic" in the glossary. In his *Plant Physiology and Ecology*,² page 104, we find the following:—"The type of parasitism in which the presence of the parasite benefits the host-plant in some measure is commonly distinguished as symbiosis or mutualism." This view of both parasitism and symbiosis is unusual, but admits of his use of the expression, "parasitic on algae." Nowhere in the keys does one get any adequate statement of the relationship of the lichen to a substratum, and this omis-

1 Fünfstück, Moritz, Beiträge zur Entwicklungsgeschichte der Lichenen. 1—20, pl. 3 and 4. Berlin. Gebrüder Borntraeger, 1884. Reprint from Jahrb. K. Bot. Gart. u. Bot. Mus. Berlin. 3: 1884.

2 Clements, F. E. *Plant Physiology and Ecology*. I-XV. 1-315 f. 1-125. New York. Henry Holt and Company, 1907.

sion, with the constant statement of the relationship with an alga, will surely mislead the student. It would be much less obscure and therefore more satisfactory for the purpose of the keys to state that the algal cells or filaments are found growing within the thallus, especially since the lichen is parasitic about rather than "on" the algae, and at the same time bears a relationship to some external substratum.

Thallus is defined as "a more or less definite mass of hyphae parasitic on algae." This new definition of thallus is surprising and confusing, and the author further complicates matters by neither following his own definition nor his view that the lichen is a fungus in all parts of the keys. For instance he states that the thallus in the *Collemaceae* is "more or less distinctly gelatinous" when it is, mainly at least, the alga on which the lichen grows that is gelatinous, though portions of the lichen may be slightly gelatinized. The thallus of *Ephebe* is said to be "dwarf fruticose, much branched, dark," when it is the alga on which the lichen grows that should be thus described. Foot notes, explaining why the conventional form of description was followed, would have helped at these points. There are other similar errors which will be found easily. However, Dr. Clements has done as well as others, for of a large number of authors who have recently written regarding the lichen thallus, careful examination scarcely shows a single one who is consistent with whatever view of the nature of the lichens he attempted to follow. When we get far enough away from erroneous tradition regarding lichens we may be able to be consistent.

Under *Graphidaceae*, page 58, we find the statement: "Mycelium parasitic on yellow-green algae, forming a * * * * thallus * * * * or thallus lacking and parasitic on lichens or on bark." There is no indication of any relationship with bark in those species in which algae are found in the thallus, and the student will be misled unless a competent teacher be at hand. Doubtless there is no intention of saying that the thallus is parasitic instead of saprophytic on bark, yet the language quoted would imply that. Again on page 70, we find the following: "Mycelium inconspicuous and saprophytic, or parasitic on algae," a statement which would lead the student to conclude that the saprophytic condition does not exist when the fungus grows in relationship with the alga.

The limitation of lichen families is a matter in which there is great diversity of opinion. It would seem that Dr. Clements has been influenced, in the recognition of a few large families, by a desire to keep the lichens together as much as could be consistently done, while distributing them among fungi to the exclusion of the class *Lichenes*. The *Graphidaceae*

are made to include subdivisions containing in the aggregate about 2000 described species. He credits all of these with possessing a perithecium and states that in the *Arthoniae* the perithecium is without an exciple. It may be doubted whether any of the fruits in the *Graphidaceae* should be called perithecia, and a perithecium without an exciple is scarcely a perithecium at all. It is by no means certain what should be done with *Chiodecton*- and *Dirina*-like plants, but it appears to the writer that *Arthonia*-like plants might better be separated on the basis of fruit-character. Lack of space forbids adequate discussion of family limitations in the *Parmeliaceae* and *Physciaceae*, but it seems that the *Teloschistaceae* and the *Caloplacaceae* with their characteristic chemical relations and spore structure might better be kept separate from the *Physciaceae*.

It has been impossible thus far for most lichenists, and other botanists as well, to relieve themselves of tradition sufficiently to see that the dual-hypothesis theory and the consortism theory of lichens are alike untenable, and of the few who have concluded that the lichen is after all a fungus pure and simple only two, Dr. C. E. Bessey¹ and Dr. Clements, have attempted to devise ways of distributing the lichens to the exclusion of the class *Lichenes*. Bare distribution without statement of reasons why lichens should be thus distributed is not very convincing to botanists who think that these plants should still be retained in a distinct group, but the writer is convinced that anyone who goes very deeply into the study of lichens, at the same time freeing himself as much as possible from the influence of tradition, must finally conclude that the distribution of lichens in some such manner as that proposed by Dr. Clements is the only proper treatment of those plants and that the only question that remains is the manner of distribution. We can not hope for a very satisfactory solution until further studies of *Ascomycetes* gives us a more thorough knowledge of the relationships of these plants, but Dr. Clements' treatment furnishes a working basis and appears to be better than retaining the artificial group *Lichenes*. In this lies the great value of Dr. Clements' work so far as the lichens are concerned.

Another commendable feature of the work is the application of the terminology of mycology to lichens. Since the close relationship of these plants to other fungi seems apparent, much of the antiquated and objectionable terminology of lichenology may well be dispensed with. The excellent glossary and the comparatively complete index of genera of fungi are in themselves very helpful.

It will readily be seen that much of the matter which the writer finds objectionable will not interfere with the use of the keys, which seem to be workable in spite of the faults pointed out. We trust that a revision may appear in due time, which will obviate certain faults and add considerably to the value of the work. In the meantime, the volume will be found helpful to those who work on lichens or other fungi.

Miami University, Oxford, Ohio.

1. Bessey, C. E. A Synopsis of Plant Phyla. University of Nebraska Studies 74. 1-99. 1907.

SOME ADDITIONS TO THE MOSS FLORA OF THE UNITED STATES

JOHN M. HOLZINGER

ANDREAEAE BLYTTII B. & S. This moss was collected by Prof. J. B. Flett on Mount Tacoma (Mt. Rainier) on July 25, 1905, at an altitude of 5500 ft.

OLIGOTRICHUM HERCYNICUM DC. This was also collected by Prof. Flett 300 ft. higher up on Mount Tacoma, i. e., 5800 ft.

DIDYMODON FLEXIFOLIUS (Dicks) Hook. & Taylor. This moss was collected by Dr. A. J. Grout, on Chestnut Bald, North Carolina, Sept. 4, 1907, at an altitude of 5900 ft. Mr. R. S. Williams, of the New York Botanical Garden, has kindly verified this determination of Dr. Grout's plant. This moss is also new to North America and will be distributed in my next fascicle of "Musci Acrocarpi Boreali-Americani." (Just received as No. 264. Ed.)

GRIMMIA AGASSIZII L. & J. This plant agrees with "Canadian Mosses" No. 80a, determined by Dr. N. C. Kindberg. It does not agree fully with the description of *Grimmia Agassizii* in Lesquereux & James' Manual, p. 136, in the following points: Leaves are not appressed when dry, but slightly curled at top; are not shining, blackish (except those very old), linear lanceolate from a slightly broader base, obtuse and coarsely sparingly dentate at the apex, but are rather dull light or pale green (when fresh), the lower very narrowly triangular, the comal leaves rapidly becoming twice their length, gradually widening from the narrow base to about the middle, then narrowing more abruptly to a slender subulate apex which is entered, but not reached, by the thick terete costa. There are no teeth at all on the leaves of either the Canadian or this plant; but what might be taken for teeth on leaves are rather large low papillae which cover both surfaces in the upper half of the leaf. The leaves are soft and brittle, and are easily torn. When mounted in water they lie quite flat. For a third to half the length from the base the leaf cells are elongated-rectangular, and pellucid, becoming shorter and isodiametric as they meet the denser squarish cells of the upper part of the leaf. But the most distinctive feature of this moss is the fact that the lamina is for most of its length *bistratose*, becoming only below the middle sporadically *unistratose*.

The capsule, dry or wet, is perfectly smooth and a transparent pale yellow, short-oval, surmounted by a short-beaked operculum, the beak being as long as the operculum is wide. The vaginule, lacking paraphyses,

apparently, is longer than the short seta; and it, with seta and beaked capsule is barely half as long as the perichaetial leaves.

The teeth are correctly described in the Manual.

The spores are smooth, pale yellow, $22-26\mu$ (not quite ripe).

This is a beautiful species, at once known by its pale green color, the soft, tender leaves quite devoid of hairpoints, straight when moist, and bistratose lamina. It was collected in the summer of 1904, near Catala, Alaska, Mr. G. C. Britton, United States Commissioner at that place, and was communicated to me as No. 5, by Prof. J. B. Flett.

Winona, Minnesota.

MUSCI ACROCARPI BOREALI-AMERICANI

(Issued by Dr. J. M. Holzinger)

A. J. GROUT

Numbers 251-275 have just been received from Prof. Holzinger. There are a number of good things such as *Bryum Oreganum* Sulliv., from Washington; *Dicranoweisia contermina* Ren. & Card., from Washington; *Dicranum Bergeri* forma *compacta* Best, from North Carolina; *Didymodon flexifolius* (Dicks.) Hook. & Taylor, from North Carolina, (this is new to North America); *Nanomitrium Austinii* (Sulliv.) Lindb., from Connecticut; *Oligotrichum parallelum* (Mitt.) Kindb., from Washington; *Polytrichum sexangulare* Floerke, from Washington; *Systegium Ludovicianum* (Sulliv.) Jaeg., from Louisiana, and *Trichostomum flavovirens* Bruch., from North Carolina.

The wide range from which the specimens come and the novelty of some of the numbers make this one of the most interesting of the fascicles thus far issued, and no collection will be complete without Prof. Holzinger's mosses.

Nine numbers from Europe make us wonder if Atlantis has reappeared and the continents become reunited.

New Dorp, New York.

LICHENS OF MT. ASCUTNEY, VERMONT.

R. HEBER HOWE, JR.

Dr. H. E. Hasse having just returned to me the only crustose lichen I collected on Mt. Ascutney, Vermont, I wish to add it to the list given in THE BRYOLOGIST for January, 1910.

Lecidia platycarpa Ach. One fertile specimen collected on granite rock, on August 25, 1909, at two thousand feet elevation. Spores $12-18\mu$ by $6-8\mu$.

This makes 45 species.

ADALBERT GEHEEB.

March 21st, 1842—Sept. 13th, 1909.

The collection of this distinguished bryologist has recently been bought by a friend for \$5,750.00 and presented to the Botanical Museum of Berlin. A notice by Dr. J. Röhl, of Darmstadt, has been published in the *Allgemeine Botanische Zeitschrift* ar. 11. 1909, and gives a short biographical sketch and a list of his principal bryological contributions and collections. These include those made by Puiggari and others at Rio and San Paulo, Brazil, a few from Mexico, and one collection from California made by Miss Blackler in 1896. He was one of the Associates of the *Revue Bryologique*.

ELIZABETH G. BRITTON.

CAROLYN WILSON HARRIS.

MARY F. MILLER.

The death of a well-known member of the Sullivant Moss Society, Mrs. Carolyn W. Harris, occurred on May 3rd, 1910, at Lakewood, New Jersey. Mrs. Harris had been ill with pneumonia only five or six days, and her death was a great shock to both relatives and friends. One son survives her.

As organizer and first head of the Lichen Department, as Vice president of this Society, and as the author of many articles on various lichen genera and species, Mrs. Harris was for years an indefatigable worker, and did much to popularize the study of lichens; her help was always given freely and cheerfully to those who applied to her for assistance in their studies. She was Vice-president of the Moss Society during 1904 and 1905; and had charge of the Lichen Department from 1901 to 1905, when, owing to a serious illness, she was obliged to give up all active work. Since then, though she never regained her strength sufficiently to engage in such work again, her interest in the Society never flagged;—she has continued to distribute lichens to the members through the "Offering" department of *THE BRYOLOGIST*; and the lichen-herbarium has also been frequently enriched by her generous contributions,—indeed, less than a week before her death she forwarded a package of foreign lichens, saying she did not feel equal to studying them herself, though she was growing stronger every day.

So we mourn sincerely for this dear friend, whose sweet kindness and courtesy and pleasant words of encouragement greatly endeared her to all who knew her, either personally or through correspondence.

Washington, D. C.

SULLIVANT MOSS SOCIETY NOTES.

The ticket for Officers of the Sullivant Moss Society for the year 1911, will be given in the November number, and voting will begin at that date.

The seventh meeting of the Sullivant Moss Society, in affiliation with the American Association for the Advancement of Science, will be held next December in Minneapolis; details will be given in the November number. Dr. George H. Conklin, 1204 Tower Ave., Superior, Wisconsin, has consented to take charge of the preliminaries and act as secretary for the meeting. Let him know as early as possible what you can offer in the way of papers, exhibits, etc., and please consider this as personally addressed to yourself.

NEW MEMBERS.—Since the May number we list the following: No. 207. Mr. George L. Kirk, 18 East Washington street, Rutland, Vermont. No. 208. Mr. Homer P. Rogers, Box 51, Jamestown, New York. No. 209. Mr. Philip G. M. Rhodes, 33 Duchess Road, Edgbarton, Birmingham, England.

MARINE ALGAE FOR SALE.—Forty-eight named species from California and Florida. Many are mounted. Also eighty species from South Florida mounted but not named. Address Mr. W. W. Calkins, Berwyn, Cook Co., Illinois.

NOTICE.—Prof. Bruce Fink is making a study of the **Graphidaceae** and would like to secure specimens from persons who are now collecting in tropical or subtropical regions or who may collect in such regions in the next few years. He will be especially obliged for any aid in this matter. Address correspondence to him at 504 Maple Avenue, Oxford, Ohio.

FOR SALE.—Sullivant's "Icones" with "Supplement." 2 Vols. Cloth. Last quoted price in Junk's Catalogue, \$35.00. Liberal discount for immediate cash sale. Apply to Miss Edith A. Warner, Burdett, Schuyler Co., New York.

Leopold Loeske announces as published his work entitled "Studien zur vergleichenden Morphologie und Phylogenetischen Systematik der Laubmoose," 224 pages, well bound, price \$1.50. Address Mr. Max Lande, Haendelstrasse, 3, Berlin, Germany.

OFFERINGS.

(To Society Members only. — For postage.)

- Mr. George B. Kaiser, 524 Locust Ave., Germantown, Pa. *Octoblepharum albidum* (L.) Hedw., collected in Florida; *Jubula Pennsylvanica* (Steph.) Evans, collected in Pennsylvania; *Umbilicaria pustulata papulosa* Tuckerm.; *Cladonia verticillata cervicornis* (Ach.) Flk. collected in Pennsylvania.
- Dr. H. S. Jewett, 15 West Monument Ave., Dayton, Ohio. *Catharinea angustata* Brid.; *Entodon seductrix* (Hedw.) C. Muell., collected at Sulphur Lick Springs, Ohio.
- Rev. James Hansen, St. John's University, Collegeville, Minn. *Hypnum Haldanianum* Grev.; *Thuidium microphyllum* (Sw.) Best var. *lignicola* Kindb.
- Mr. Edward B. Chamberlain, 38 West 59th street, New York City. *Pterygo-phyllum lucens* (L.) Brid., collected in northern Italy by E. Corti.
- Mr. D. L. Dutton, Brandon, Vermont, R. F. D. 2. *Hypnum giganteum* Sch. st.; *Andreaea Rothii* W. & M. cfr.; *Ricciocarpus natans* (L.) Corda, all collected in Vermont.
- Mr. George L. Kirk, 18 East Washington street, Rutland, Vermont. *Trichocolea tomentella* (Ehrh.) Dum.; *Polytrichum Ohioense* R. & C.; *Physcomitrium turbinatum* (Rich.) C. Muell.
- Dr. John L. Sheldon, West Virginia University, Morgantown, W. Va. *Frullania squarrosa* (R. Bl. & N.) Dumort. *F. Eboracensis* Gottsche, collected in W. Virginia.; *Hypnum imponens* Hedw.; *Brachythecium digastrum* (C. Muell.) Kindb.
- Dr. John W. Bailey, 4541 Fourteenth Ave., N. E., Seattle, Wash. *Rhacomitrium varium* Lesq. & J.
- Mrs. A. F. Browne, Bridgetown, Nova Scotia. *Hylocomium proliferum* (L.) Lindb.
-

Please take notice. There will be no issue of THE BRYOLOGIST in September but a double number will appear the first of November.

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PART V.

**MOSESSES WITH HAND-LENS AND
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will be issued in June, 1910. Shall we send you a copy? This completes the work. Price, \$1.25 per part, post paid. Bound in cloth, \$7.00; in half leather, \$7.50. 8x11 inches, over 400 pages, 88 full page plates and 265 figures in the text. Printed by McFarland on the best coated paper.

"The book is admirable both in conception and execution." Prof. C. R. Barnes, Univ. of Chicago, in Bot. Gazette for June, 1904.

"The best elementary manual of mosses in any language." Prof. J. M. Holzinger, Winona, Minn., State Normal, in BRYOLOGIST.

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SEPT.—NOV. 1910



THE BRYOLOGIST

AN ILLUSTRATED BIMONTHLY DEVOTED TO
NORTH AMERICAN MOSSES

HEPATICS AND LICHENS

FOUNDED IN 1898

By

ABEL JOEL GROUT, Ph.D.

EDITOR

ANNIE MORRILL SMITH

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Carolyn W. Harris
1900 -

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A MEMOIR OF CAROLYN WILSON HARRIS.

BRUCE FINK.

Mrs. Carolyn Wilson Harris was born in Springfield, Ohio, December 8th, 1849, and died at Lakewood, New Jersey, May 3d, 1910. She was a life-long lover of nature and a devoted student of Botany, in whose death the Sullivant Moss Society has lost a good friend and an earnest worker. She took an active part in the botanical department of the Brooklyn Institute of Arts and Sciences, but it was through her collecting in northern New York and her writings that members of our Society came to know her best.

About twenty-five years ago, Mr. and Mrs. Harris purchased a large tract of land for a summer home along Chilson Lake, Essex County, New York. During her first summers in this delightful place, Mrs. Harris devoted her time to the study of the ferns and the flowering plants, but later her attention was given to the mosses, hepatics and lichens, especially the lichens. Those of us who know the great profusion and beauty of lichen growth in the northern tier of states from Maine across the continent to Washington understand why the attention of this lover of nature was drawn to these plants which abounded everywhere about her cottage and along the shores of the lake.

Mrs. Harris sent out from her attractive summer home many specimens of foliose and fruticose lichens to friends whom she tried to interest in the study of these plants and to various lichenists as well. The higher lichens of her region were well known to her, and she could call them by the names used in Tuckerman's Manual, caring little for the modern controversies over priority of names or the tendency to splitting, which is the bane of amateur lovers of nature.

To Mrs. Harris belongs the honor of being the first to interest *THE BRYOLOGIST* in lichens. At least her articles were the first papers on lichens to appear in that journal, and she was the first to have charge of the lichen department. It was through her work that the present writer, like others interested in lichens, was first drawn to *THE BRYOLOGIST*. Through mutual interest in lichens, the correspondence between Mrs. Harris and the writer began in 1901 and lasted until the time of her last illness. We learn from this correspondence that the lichens were given place in *THE BRYOLOGIST* "because members of the Moss Chapter were continually sending lichens—either calling them mosses or asking for information regarding them." At the time when Mrs. Harris was writing her first article for *THE BRYOLOGIST*, her letter contained the following: "Comparatively few people are interested in these beautiful plants, and there is much work to be done, especially for beginners. I am writing a series of articles for *THE BRYOLOGIST* for beginners, and find that in order to be really helpful, I must have specimens to describe from various localities." This gives a clue to the incentive which led to the lichen department in *THE BRYOLOGIST*.

The illustrated series of twelve papers published in *THE BRYOLOGIST* is well known to all readers of our journal. In these articles, Mrs. Harris aimed to give such knowledge of the common foliose and fruticose lichens as would enable one to know them from the descriptions and illustrations, aided by the hand lens. There is always some doubt in the minds of botanists regarding the scientific value of short diagnoses of lower plants, in which the microscopic characters are omitted, but there is good evidence that some persons became interested in lichens through these papers, which were well illustrated. Mrs. Harris wrote in 1901: "I am trying in my articles to describe the lichens so that they can be determined with the hand lens. I know that I am attempting a good deal, but with many of the lichens, I believe this is possible." In 1903 she wrote thus: "Among my correspondents are a number who are not only interested but ready to begin work. Surely we should have a club or chapter for the benefit of the beginners as well as the students." The last quotation is from a letter written only a short time before the last of the series appeared and indicated that their author had succeeded in interesting a number of persons. Doubtless these as well as several students of lichens were sorry when the series of papers was finally closed after only about twenty-four genera had been covered. However, these papers were certainly valuable in interesting readers in lichens; and a number of collectors were attracted to the study of lichens through them.

It seems that Mrs. Harris became especially interested in the genus *Cetraria*, even before this series of papers was begun. This was probably due to observations in the field, in the region where these plants are abundant. In one letter, she asks for specimens of species of the genus, "both native and foreign," and says: "The *Cetrarias* have always been particularly interesting to me." Five years later she wrote: "The *Cetraria* monograph is still a dream, but I hope it will prove something more later."

In 1907 occurred the death of Mr. Harris; and shortly after his death, Mrs. Harris suffered an attack of pneumonia. The sickness and death of Mr. Harris and her own illness interrupted her work on lichens for a time, but in 1908 she was again collecting and studying, and from this time on until her last illness, the writer occasionally received specimens from her for examination. She spent the winter of 1908 in Washington, where she enjoyed working with Miss Mary F. Miller, who has charge of the lichen department in *THE BRYOLOGIST*. It was during this winter in Washington that the writer met Mrs. Harris and enjoyed several conversations with her regarding lichens and lichenists. No words could add to the high regard for the pleasing personality of Mrs. Harris, held by all who knew her personally. There was abundant evidence of refinement in her beautiful letters; but the poise and gentleness of character were much more apparent in personal acquaintance.

Though her papers deal with macroscopic characters, Mrs. Harris knew her plants microscopically and took special delight in talking or writing about her herbarium specimens. Her herbarium, books and working outfit

will be deposited at Antiock College, Yellow Springs, Ohio, where Mr. Harris graduated. The list of lichens, mosses and hepatics will be published by Mrs. Annie M. Smith, who possesses a full set of the specimens.

Many persons have wondered why the lichens, not closely related to the mosses, have received attention in THE BRYOLOGIST. The explanation is given above. There were those who confused mosses and lichens and who asked questions that must be answered. In Mrs. Harris was found a person who had long been interested in the lichens which grew in such profusion about her summer home in the Adirondacks. To her fell the task of aiding those making inquiry; and since these persons were for the most part members of the Moss Society, the official organ of this society was made the channel through which to give the desired information.

Below is what is supposed to be a complete list of Mrs. Harris' papers on lichens:

- Harris, Carolyn W. Lichens—The Usneas. THE BRYOLOGIST 4: 13-15. pl. 1. Ja. 1901.
 Lichens—Alectoria, Evernia and Ramalina. THE BRYOLOGIST 4: 36-39, f. 1-8. Ap. 1901.
 Lichens—Cetraria. THE BRYOLOGIST 4: 41-45. pl. 5. f. 1-6. Jl. 1901.
 Lichens—The Parmelias. THE BRYOLOGIST 4: 57-61. pl. 6 f. 1-7. O. 1901.
 Lichens—Physcia. THE BRYOLOGIST 5: 21-24. pl. 3. f. 1-6. Mr. 1902.
 Lichens—Theloschistes-Pyxine. THE BRYOLOGIST 5: 59-62. f. 1-7. Jl. 1902.
 Lichens—Umbilicaria. THE BRYOLOGIST 5: 89-92. pl. 9. N. 1902.
 Lichens—Sticta. THE BRYOLOGIST 6: 55-58. pl. 9. f. 5-7. Jl. 1903.
 Lichens—Nephroma-Solorina. THE BRYOLOGIST 6: 76-79. f. 1-2. S. 1903.
 Lichens—Peltigera. THE BRYOLOGIST 7: 1-4. pl. 1. f. 1-2. Ja. 1904.
 Lichens—Collema-Leptogium. THE BRYOLOGIST 7: 45-48. pl. 6. My. 1904.
 Lichens—Stereocaulon, Pilophorus and Thamnolia. THE BRYOLOGIST 7: 71-75. f. 1-4. S. 1904.
 Report of the Lichen Department. THE BRYOLOGIST 6: 40. Mr. 1903.
- Harris, W. P. and Harris, Carolyn W.—Lichens and Mosses of Montana. Bull. Univ. Mont. 10: 313-330. pl. 58-64. 1904.
 Oxford, Ohio.

A KEY TO THE SPECIES AND PRINCIPAL VARIETIES OF CLADONIA OCCURRING IN NEW ENGLAND.

LINCOLN WARE RIDDLE.

One of the most urgent needs in the study of lichens at the present time is a set of keys to the larger genera. So far as I am aware no key to the New England species of *Cladonia* has ever been published. It is to contribute toward filling this need that the following key is here offered. It is based on the study of an extensive series of specimens, and has been tested by several students, both inexperienced and experienced. Yet, in a genus where the species are as variable as in *Cladonia* and where such puzzling transitional forms occur, it is not to be expected that any key can be constructed that will serve for the determination of all specimens. It is hoped, however, that with material which is fairly typical, satisfactory results may be obtained. For the authors and synonymy of the species given, reference may be made to the alphabetical list at the end of the key.

Sect. I. Primary thallus persistent and crustaceous. Podetia short (mostly under 1 cm.), club-shaped, simple or branched, apothecia pale brown, poorly developed..... *C. papillaria*.

Sect. II. Primary thallus squamulose when present, often disappearing.

Sub Sect. 1. Squamules when present medium-sized to small, whitish on under side. (For Sub-Sect. 2, see end of key).

Series 1. Apothecia red. (Rarely the species of this series may have pale yellowish-brown apothecia, a condition known as var. *ochrocarpia*).

A. Podetia cylindrical, without cups.

B. Green to yellow, smooth to warty, never sorediate.

C. Simple below, sparingly branched above.

D. Podetia reduced, squamules of thallus sorediate

C. cristatella v. *paludicola*.

DD. Podetia well developed, thallus not sorediate.

E. Podetia with few squamules or none..... *C. cristatella*.

EE. Podetia densely squamulose..... *C. cristatella* v. *vestita*.

CC. Podetia branched throughout..... *C. cristatella* v. *ramosa*.

BB. Grayish, powdery-sorediate.

C. Thallus scanty, podetia rarely squamulose.

D. Podetia stout, sparingly branched, KOH+.... *C. macilenta*.

DD. Podetia slender, simple, KOH—..... *C. bacillaris*.

- CC. Thallus well-developed, podetia short, squamulose, decorticate between the squamules.....*C. didyma*.
 - AA. Podetia cup-bearing.
 - B. Podetia medium-sized (mostly 2 cm. or less).
 - C. Podetia white-powdery-soresiate, cup with incurved margins, commonly proliferating.....*C. digitata*.
 - CC. Podetia warty or granulate-soresiate, cups dilated, rarely proliferating....*C. coccifera*.
 - BB. Podetia elongated (mostly 4 cm. or over), yellowish.
 - C. Podetia sulphur-powdery, never squamulose....*C. deformis*.
 - CC. Podetia smooth and densely squamulose.*C. bellidiflora*.
 - Series 2. Apothecia brown.
 - A. Podetia cylindrical, without cups.
 - B. Podetia simple or nearly so, primary thallus usually persistent.
 - C. Podetia absent or thickly squamulose.
 - D. Podetia absent or nearly so, squamules coarse.
 - C. caespiticia*.
 - DD. Podetia evidently present, squamules fine, often soresiate.
 - E. Podetia short (1 cm. or less).....*C. delicata*.
 - EE. Podetia taller (2 cm. or more).....*C. decorticata*.
 - CC. Podetia present and with few squamules or none.
 - D. Corticate, without soredia or granules.
 - E. Cortex continuous or nearly so.
 - F. Podetia short (mostly less than 2 cm.).
 - G. Squamules fine, podetia slender in proportion to the apothecia*C. mitrula*.
 - GG. Squamules coarse, podetia stouter.
 - H. Typically simple, KOH+ (red)*C. subcariosa*.
 - HH. Branched above, KOH—...*C. cariosa* v. *corticata*.
 - FF. Podetia elongated (over 3 cm.).
 - G. Slender, little inflated.....*C. gracilis* v. *chordalis*.
 - GG. Stout, much inflated.....*C. gracilis* v. *elongata*.
 - EE. Cortex fissured, irregular and uneven.....*C. cariosa*.
- DD. More or less decorticate, soresiate, or granulate.
 - E. Scurfy-granulate*C. pityrea*.
- EE. Powdery-soresiate.
 - F. Podetia perforate, gray*C. glauca*.
- FF. Podetia not perforate.
 - G. Podetia whitish throughout.

- H. Simple, 2 cm. high or less.. *C. fimbriata* v. *coniocrea*.
- HH. Sparingly branched, 3 cm. high or more.
C. fimbriata v. *subulata*.
- GG. Podetia brown below..... *C. cornuta*.
- BB. Podetia repeatedly branched and forming more or less intricate masses, thallus mostly disappearing.
- C. Podetia corticate, smooth, squamules when present coarse.
- D. Yellowish-green, tips fastigate, blunt..... *C. uncialis*.
- DD. Grayish or brownish-green, tips dichotomous, acute.
- E. Cortex continuous, without soredia.
- F. With few squamules or none.
- G. Podetia more or less erect, in loose masses.
- H. Podetia wholly gray..... *C. furcata*.
- HH. Brown, especially above... *C. furcata* v. *palamaea*.
- GG. Podetia intricately intertangled in dense masses.
C. rangiformis.
- FF. More or less covered with coarse squamules.
C. furcata v. *pinnata*.
- EE. Cortex broken in places, and sorediate especially above.
C. furcata v. *scabriuscula*.
- CC. Podetia decorticate, squamules when present fine.
- D. Podetia without squamules.
- E. Ultimate branches recurved, tips blunt... *C. rangiferina*.
- EE. Ultimate branches more erect, tips acute.
- F. Loosely branched, in irregular masses..... *C. sylvatica*.
- FF. Intricately branched, in dense rounded tufts.
C. alpestris.
- DD. Podetia covered with fine squamules.
C. squamosa v. *muricella*.
- AA. Podetia cup-bearing, often proliferating (i. e. branching from the margins of the cup).
- B. Cups perforate.
- C. Without soredia.
- D. With scattered coarse squamules or none.
- E. Podetia smooth.
- F. Slightly inflated, cups narrow..... *C. crispata*.
- FF. Much inflated, cups spreading, often becoming leafy.
C. turgida.

- EE. Podetia pitted..... *C. reticulata*.
- DD. Covered with fine squamules..... *C. squamosa*.
- CC. Gray powdery-soresiate..... *C. cenotea*.
- BB. Cups never perforate.
- C. Corticate and smooth.
- D. Gray or brownish green.
- E. Proliferations from margins of cups.
- F. Cups regular, squamules few or none *C. gracilis*.
(*C. gracilis* v. *chordalis* and *elongata* may also be sought here).
- FF. Cups irregular, podetia squamulose.
C. gracilis v. *dilatata*.
- EE. Proliferations from center of cup..... *C. verticillata*.
- DD. Yellowish-green *C. amaurocrea*.
- CC. Podetia warty or decorticate.
- D. Powdery-soresiate.
- E. Cups regular and simple *C. fimbriata*.
- EE. Cups irregular and proliferous... *C. fimbriata* v. *radiata*.
- DD. Not powdery-soresiate.
- E. Areolate-warty, cups ample.
- F. Simple or nearly so..... *C. pyxidata*.
- FF. Luxuriantly proliferous..... *C. degenerans*.
- EE. Scurfy-granulate, cups reduced..... *C. pityrea*.
- Sub-Sect. 2. Squamules always present, strikingly large, creamy-yellow on underside..... *C. foliacea* v. *alcicornis*.

Alphabetical list of the species and varieties with the authors and with synonyms used in Tuckerman's "Synopsis of North American Lichens."

- Cladonia alpestris* (L.) Rabenh. (*Cl. rangiferina* var. *alpestris* (L.) Schaer.)
- " *amaurocrea* (Flke.) Schaer.
- " *bacillaris* Nyl. (*Cl. macilenta* (Ehrh.) Hoffm. in part.)
- " *bellidiflora* (Ach.) Schaer.
- " *caespiticia* (Pers.) Flke.
- " *cariosa* (Ach.) Spreng.
- " " var. *corticata* Wainio. (*Cl. symphyocarpa* in part, of American authors, not Fries.)
- " *cenotea* (Ach.) Schaer.
- " *coccifera* (L.) Willd. (*Cl. cornucopioides* (L.) Fr.)
- " " var. *ochrocarpia* Flke.
- " " " *pleurota* (Flke.) Schaer.

Cladonia cornuta (L.) Schaer.

- " *crispata* (Ach.) Flot. (*Cl. furcata* var. *crispata* Flke.)
- " *cristatella* Tuck.
- " " var. *ochrocarpia* Tuck.
- " " " *paludicola* Tuck.
- " " " *ramosa* Tuck.
- " " " *vestita* Tuck.
- " *decorticata* (Flke.) Spreng.
- " *deformis* Hoffm.
- " *degenerans* (Flke.) Spreng.
- " *delicata* (Ehrh.) Flke.
- " *didyma* (Flke.) Wainio. (*Cl. pulchella* Schwein.)
- " *digitata* Schaer.
- " *fimbriata* (L.) Fr. (*Cl. fimbriata* var. *tubaeformis* Fr.)
- " " var. *coniocrea* (Flke.) Wainio.
- " " " *radiata* (Schrad.) Coem.
- " " " *subulata* (L.) Wainio.
- " *foliacea* " *alcicornis* (Lightf.) Schaer. (*Cl. alcicornis* (Lightf.) Flke.)
- " *furcata* (Huds.) Schrad. (*Cl. furcata* var. *racemosa* of Tuck., in part.)
- " " var. *palamaea* (Ach.) Nyl. (*furcata* var. *subulata* Flke.)
- " " " *pinnata* (Flke.) Wainio. (*Cl. furcata* var. *racemosa* of Tuck., in part.)
- " " " *scabriuscula* (Del.) Coem. (Not recognized by Tuckerman.)
- " *glauca* Flke. (*Cl. cenotea* var. *furcellata* Fr.)
- " *gracilis* (L.) Willd. (*Cl. gracilis* var. *hybrida* of Tuckerman in part.)
- " " var. *chordalis* (Flke.) Schaer. (var. *elongata* f. *chordalis* Fr.)
- " " " *dilacerata* Flke. (var. *hybrida* of Tuckerman in part.)
- " " " *elongata* (Jacq.) Flke. (var. *elongata* f. *macroceras* Fr.)
- " *macilenta* (Ehrh.) Hoffm.
- " *mitrula* Tuck.
- " *papillaria* (Ehrh.) Hoffm.
- " *pityrea* (Flke.) Fr. (*Cl. fimbriata* var. *adspersa* Tuck., in part.)
- " *pyxidata* (L.) Fr.
- " *rangiferina* (L.) Web.
- " *rangiformis* Hoffm. (*Cl. furcata* var. *pungens* Fr.)
- " *reticulata* (Russell) Wainio. (*Cl. Boryi* Tuck.)

Cladonia squamosa (Scop.) Hoffm.

“ “ var. *muricella* (Del.) Wainio. (*Cl. squamosa* f. *attenuata* Fr.)

“ *subcariosa* Nyl. (*Cl. gracilis* var. *verticillata* f. *symphycarpia* Tuck., *Cl. symphycarpa*, in part, of American authors, not Fries.)

“ *sylvatica* Hoffm. (*Cl. rangiferina* var. *sylvatica* (L.) Schaer.)

“ *turgida* (Ehrh.) Hoffm.

“ *uncialis* (L.) Web.

“ *verticellata* Hoffm. (*Cl. gracilis* var. *verticellata* Fr.)

Reprinted by permission from *Rhodora* for November, 1909. Although intended primarily for New England, the key will serve almost equally well for any part of the north-eastern United States.

Wellesley, Mass.

“THE LICHENS OF MINNESOTA.”

A Review.

LINCOLN W. RIDDLE.

In 1896 appeared in the Minnesota Botanical Studies the first of Professor Bruce Fink's now well-known series of papers setting forth the ecological and distributional data resulting from an extensive field study of the lichens of Minnesota. The seven years that have elapsed since the last number of this series have been devoted to a critical study of the material in the herbarium and library. We now have the final systematic results of this study published under the title “The Lichens of Minnesota” as one of the contributions from the U. S. National Herbarium (Vol. 14, part 1, pp. 1-269, with 51 plates, and 18 text-figures. Published by the Smithsonian Institution, Washington, D. C. June 1, 1910).

Professor Fink states that the book is intended not only for specialists but also for younger students. Accordingly, the first 33 pages are devoted to a general account of the morphology, reproduction, and economic role of lichens, the text being illustrated with figures taken from various authorities. We then come to the descriptive catalogue of Minnesota lichens, with an outline of the classification adopted by the author, a key to the genera, and a systematic account of the species and subspecies of each genus, with keys, detailed descriptions, habitat notes, and geographical range. This catalogue includes 439 species and subspecies. A glossary and index close the book.

Several factors make this work the most notable publication in North American Lichenology since the appearance of Tuckerman's Synopsis. The first factor is the long experience of the author in the study of lichens in general, covering a period of twenty-five years, during which he has had the

benefit of correspondence with the foremost American and European students, and during the latter part of which he has been called upon as a specialist to study collections from many parts of the country. The second factor is the long continued and thorough special work in Minnesota, upon which the book is based, extending as it does over fifteen years of field and herbarium study. The book is especially noteworthy in being the first American publication, including a large proportion of our species, to contain complete keys to the genera and species. The lack of such keys has been a serious handicap to all students of lichens, and especially to beginners in the study. Another feature of the work which is deserving of special mention is the large number of excellent photographs of typical specimens, with which the descriptive catalogue is illustrated. As an aid to the recognition of the plants and as an indication of their natural habits these photographs leave nothing to be desired.

Professor Fink's experience and the conservatism of his previous publications lead us to examine with special interest the views on classification expressed in this work. The general outlines of the classification and the arrangement and limitation of the families is in general similar to that proposed by Doctor Zahlbruckner in Engler and Prantl's *Die Natürlichen Pflanzenfamilien*, which undoubtedly represents better than any other system yet offered our present ideas as to the natural classification of lichens. Professor Fink's most marked departures from this are in retaining *Buellia* among the Lecideaceae, a safe and conservative procedure, and in placing the Pyrenocarpineae at the end of the system. This position seems to be open to question. While it is clearly recognized that no linear arrangement can truly represent a natural system of classification it is generally assumed that the groups placed at the end of the system are the highest in evolution. The placing of the Pyrenocarpineae in such a position can only be justified as following the custom of the mycologists in placing the Pyrenomycetes above the Discomycetes among the fungi. For those who hold the view that the lichens represents lines of evolution in a different direction from the other fungi, a position for the lowly organized Pyrenolichenes at the beginning of the system seems much more natural.

In the matter of generic limitations Professor Fink has followed the best mycological usage of the present day in recognizing the value of spore-differences, especially among the crustaceous lichens, where the thalline characters are of such slight importance. The following genera for the most part based on spore-differences are recognized in the present work, having been included by Tuckerman in other genera: *Chaenotheca*, *Biatorella*, *Megalospora*, *Biatorina*, *Bilimbia*, *Bacidia*, *Rhizocarpon*, *Psora*, *Toninia*, *Icmadophila*, *Synechoblastus*, *Gyrophora*, *Acarospora*, *Haematommia*, *Arthopyrena*, *Thelocarpon*, *Dermatocarpon*. These genera are almost universally recognized among European lichenologists, but American students have been slow in accepting them on account of the weight of Tuckerman's authority. Professor Fink has done well therefore in encouraging a more liberal interpretation of generic limits. The recognition of

these genera has made necessary some new combinations in specific names, but we are glad to say that these are not many. It may be noted in passing that as the author of one of these new combinations, *Bacidia akompsa* (Tuck.), Dr. Herre has priority in his "Lichens of the Santa Cruz Peninsula, California" (Proc. Wash. Acad. Sci. vol. 12, no. 2, pp. 27-269. May 15, 1910).

The problem of the "type-species" of genera is one which has as yet reached no satisfactory solution, and upon which depends much of the future of botanical nomenclature. Professor Fink has contributed to the problem among the lichens by citing under each genus the first species to be described under that generic name. According to some authorities this would be the type species. If this rule were to be followed among the lichens, where so many of the generic names rest upon a basis of long usage only, the resulting changes and confusion would be such as to render the nomenclature of lichens a hindrance rather than an aid. We are glad to find that while Professor Fink has indicated what he considered to be the type species under each genus, he has wisely left the carrying out of the application of the principle to future study, and has left the generic names to stand according to their long accepted interpretation.

In the matter of specific names, he has even been what we may call ultra-conservative. Where an author of high standing shows that a specific name should be replaced by another on the basis of well-founded priority, there seems to be no good reason for not accepting the older name. An example of this is in the genus *Icmadophila*, where Wainio has shown that the specific name *ericetorum* (L.) has priority over *aeruginosa* (Scop.).

The use of trinomials for what is referred to as "sub-species" indicates clearly the need of more uniformity among lichenologists in the use of the terms "sub-species," "variety," and "form," as applied to the subdivisions of polymorphic species. Such a uniformity of usage, however, would have to rest on a study of these species extensive enough to prove the relative value of their components, and such a study has as yet been made in comparatively few cases.

In refreshing contrast to many recent publications in Systematic Botany, Professor Fink has found it necessary to name only one new species in this publication—*Omphalaria minnesotensis*; and in all of his preliminary work only two new species and three new varieties. New species proposed on such a conservative scale are fairly certain to prove valid enough to stand future investigations.

Admirably adapted as the work is for the use of all students, we cannot help feeling that it might have been more valuable still if the somewhat lengthy descriptions had been condensed into diagnoses giving the essential characters and these followed by some comparative notes indicating the resemblance and differences between the species under consideration and closely related species. Such notes based on Professor's Fink's wide experience in field and herbarium would have been of the greatest value to all students. For an experienced student it is an annoyance as well as consid-

erable labor to read through two long descriptions, comparing them character by character, in order to find out in what respect the plants differ. By confining the descriptions to diagnoses or by giving the diagnostic characters in italics, this annoyance might easily have been avoided with great benefit to those who are to use the book.

The lichens found in Minnesota are, for the most part, those occurring throughout temperate North America, east of the Rocky Mountains. For all students in this region, Professor Fink's "Lichens of Minnesota," with its keys, its descriptions, its photographs, and last but not least its conservative spirit, must prove a work of the very greatest usefulness.

Wellesley, Mass.

POLYTRICHUM STRICTUM IN PENNSYLVANIA.

OTTO E. JENNINGS.

In the northwestern corner of Pennsylvania, near Linesville, in Crawford County, there is a great area of swampy or boggy land lying to the south of a row of morainal hills. This area collectively is known as the Pymatuning Swamp and extends with one interruption for a distance of about seventeen miles and in one place is about one mile wide.

During the last six years the writer has made repeated excursions to this swamp, studying the flora both ecologically and systematically, and a number of very interesting things, botanically speaking, are to be found there. The bog is in places a very characteristic Canadian Tamarack-Sphagnum bog (*Larix-Sphagnum* association) and in places has become southern in its relationship, with a Black Ash-Lizard Tail swamp (*Fraxinus nigra-Saururus* association).

In one place near Linesville there is a small area, not over half-an-acre in extent, where the vegetation is made up exclusively of a Cassandra-Polytrichum heath, and it was with considerable surprise and interest that the moss was found to be typical *Polytrichum strictum* Banks. (Collected May 28, 1908, O. E. Jennings.)

The occurrence here of this species of *Polytrichum* is noteworthy in that the species is so distinctly northern in its distribution and as far south as the northern states it is mainly restricted to rather elevated boggy alpine regions. So far as the writer is aware this species has never before been reported from either Pennsylvania or from Ohio, whose boundry line is but a few miles distant, and, furthermore, the moss occurs here at a comparatively low elevation, about 980 feet above the sea.

Carnegie Museum, August 22, 1910.

NOTES FROM EUROPE.

ANNIE LORENZ.

The following are brief notes of the writer's collecting experiences on a European trip, not undertaken primarily for botanical purposes, in the early summer of 1909.

The writer's first European botanizing was at Burgsteinfurt, a small town in Westfalen; her first walk in the Bagno, the Prinz von Bentheim's

great park, yielded *Frullania dilatata* Nees, *Lophocolea bidentata* (L.) Dum. and *Metzgeria furcata* (L.) Dum. On a most entrancing heath, all heather and Sphagnum, were offered *Alicularia scalaris* (Schrad.) Corda, *Diplophyllia albicans* (L.) Trev., *Lophozia inflata* (Huds.) Howe, *Cephalozia divaricata* (Sm.) Schiffn., *Calypogeia fissa* Raddi, and *Lophozia bicrenata* (Schmid.) Dum. was detected in a sandy ditch.

The differences and resemblances between north-western Germany and New England, particularly the White Mountains, were very interesting; this particular region was non-calcareous. *Diplophyllia albicans* here and at Iburg common and highly variable, is one of our rarest species.

Iburg, a village among the Westfalen hills, offered both kinds of substratum, the Langenberg and Freden being limestone, while the Dürnberg and Uhrberg were siliceous. The fine spruce forests of the latter had most attractive roadside ditches, full of every size of *Alicularia scalaris* and *Lophozia Mildeana* Gottsche, in neat little apple-green rosettes.

In Berlin, having been supplied with letters through the kindness of Mrs. Britton and Dr. Evans, the writer had a most delightful interview with Herr Warnstorff.

But the best collecting in Germany was in the Lausitzer Gebirge, at Oybin and Jonsdorf, among the curious glacier-worn sandstones of that region. The Oybin, 1500 ft. alt. is a bee-hive-shaped wooded hill some 500 ft. high, with a ruined monastery on top. On the damp north side were *Conocephalum* in fruit, *Mylia Taylori* (Hook.) S. F. G., *Sphenolobus minutus* (Crantz) St., *Lophocolea minor* Nees, *Dicranodontium longirostre* (Starke) Schimp., and queerly enough, *Odontoschisma denudatum* (Mart.) Dum. which certainly does not belong in the cracks of wet rocks. Along the brook in the spruce woods below the Oybin were *Riccardia multifida* (L.) S. F. G., *Chiloscyphus polyanthus* (L.) Corda, *Cephalozia bicuspidata* (L.) Dum., *Calypogeia Neesiana* (Massal. & Carest) C. M. Frib., *Sphenolobus exsectus* (Schmid.) St., *Lophozia incisa* (Schrad.) Dum., *Bazzania trilobata* (L.) S. F. G., this last not so common as with us.

Owing to the well-keptness of German forests, rotten-log species are rarities; occasional stumps can be found, but no well-furnished logs of the White Mountain kind. No *Ptilidium pulcherrimum* or *Cephalozia curvifolia* was seen on the entire trip. On the way up the Hochwald, 800 m., was the ubiquitous *Lophozia attenuata* (Mart.) Dum.

The next day, at Jonsdorf, we got *Mylia anomala* (Hook.) S. F. G. in a sphagnum bog, and on the damp sides of the Nonnenclunsen, a curious series of rocks, like nuns in procession, were *Lophozia ventricosa* (Dicks.) Dum., *Sphenolobus minutus* (Crantz) St., *Scapania memorosa* (L.) Dum. and *S. umbrosa* (Schrad.) Dum.

This region is not very far west of the Riesengebirge, that rightly favorite haunt of all good German bryologists.

At Rothenburg, which is in a limestone region, the stone walls along the Tauber river had a heavy covering of kalkhold mosses, *Anomodon viticu-*

losus, *Orthotrichum anomalum*, *Thuidium abietinum*, etc. but almost no hepatics, at least, nothing noteworthy.

At Innsbruck we climbed the extremely steep and hot mountain known as the Hafelekar, which is always shown in the pictures, overhanging the principal street. It is of limestone, and rather barren, the best finds being *Rhytidium rugosum* (Ehrh.) Kindb. and *Scapania aequiloba* Dum. which is all over Switzerland as well.

The writer's next collections were on the Axenstrasse, on Lake Lucerne, also hot dry limestone, and comprised *Jungermannia atrovirens* Schleich, *Pellia Fabroniana* Raddi, and *Scapania aequiloba* again.

Mt. Pilatus was more prolific, although there were still about two feet of slushy snow on it. We climbed down to the Klimeshorn, a spur, about 6000 ft. alt.; this mountain is also limestone, as is a large part of Switzerland. Here on a damp ledge were *Lophozia Lyoni* (Tayl.) St., *Metzgeria pubescens* (Schrank.) Raddi, *Orthotrichum rufescens* (Dicks.) B. & S., *Plagiopus Oederi* (Gunn.) Limpr. The absence of *Sphagna* leaves a very queer impression with anyone accustomed to the White and Adirondack Mountains.

Kleine Scheidegg, 6000 ft. alt., above Interlaken, was a cold, wet limestone country. At this height, above timber line, *Lophozia lycopodioides* (Wallr.) Cogn. highly variable, was the most prominent hepatic, while the usual *Cephalozia* was *C. pleniceps* (Aust.) Lindb. Kaalaas says that this is a true arctic-alpine species. *Scapania aequiloba*, and *Lophozia Muelleri* (Nees.) Dum. were on a wet, shaly slope, while lower down, about Alpiglen station, nearly at timber line, were *Lophozia Muelleri* (Nees) Dum., *Lophocolea minor* Nees, *Chiloscyphus pallescens* (Ehrh.) Dum., *Riccardia pinguis* (L.) S. F. G., *Blepharostoma trichophyllum* (L.) Dum. which is very common on the ground in alpine regions.

At the foot of the Staubbach, a spot which felt much like the base of the Willoughby, Vermont cliffs, were *Preissia quadrata* (Scop.) Nees, *Pellia Fabroniana* Raddi, and some large *Drepanocladus*, or *Cratoneuron*, among the tufts of *Saxifraga aizoides*.

On the hill back of Mürren were *Frullania Tamarisci* (L.) Dum. in great glossy mats over the limestone boulders in the pasture, *Orthothecium rufescens* (Dicks.) B. & S. in the springy places, *Sphenobolus exsectaeformis* (Breidl.) St., on an old log, *Lophozia barbata* (Schreb.) Dum., *Grimmia Doniana* Smith, *Thuidium abietinum* (L.) B. & S., and *Leucodon sciurioides* (L.) Schwaegr.

While at Montreux, we explored the Gorges de Chauderon, a charming limestone ravine near Glion. Here were *Metzgeria furcata* (L.) Dum., *M. conjugata*, *M. pubescens*, *Lejeunea cavifolia* (Ehrh.) Lindb., *Cololejeunea calcarea* Lib. and lots of *Pedinophyllum interruptum* (Nees.) Schiffn.

Zermatt offered as much as anywhere except Chamonix, perhaps on account of our longer stay. The Gorner gorge, a place much like the Flume, supplied *Scapania Bartlingii* Nees., *Lophocolea minor*, *Metzgeria*

pubescens, and *Lophozia Hatscheri* (Evans) St., while the beach along the Visp above the town, offered *Lophozia badensis* (Gottsche) Schiffn. in neat little tufts.

Along the path from the Riffelalp to Findelen glacier was the usual alpine limestone mixture, *Lophozia lycopodioides*, *Cephalozia pleniceps*, *Blepharostome*, *Pellia Fabroniana*, *Preissia*, *Lophozia Muelleri*, *L. incisa* (Schrad.) Dum. on old stumps. Over on the moraine in front of the glacier was *Fimbriaria fragrans* Nees.

Chamonix was the nearest like the White Mts., as it is siliceous ground, and here (as all through Switzerland) Bernet's Catalogue was quite invaluable. Our first walk, up the Brévent path, produced *Diplophyllia obtusifolia* Trevis., *Marsupella Funckii* (W. & M.) Dum. and *Nardia hyalina* (Lyell.) Carr. The path up to the Mer de Glace via the Mauvais Pas and back via Montanvert, yielded *Jungermannia spaerocarpa* Hook. *Lophozia alpestris* (Schleich.) Evans. *Lophozia Floerkii* (W. & M.) Schiffn., *Alicularia Geoscypha* De Not, *Marsupella Funckii*, besides many commoner species.

On the roof of Amiens Cathedral was a large crop of *Barbulae*, in fine fruit, and the writer's last collection was of *Lunularia cruciata* (L.) Dum. around a spring in the garden of friends at Halstead, England.

In Paris the writer passed a most delightful afternoon at the home of M. Renauld, who has recently died. In London she had most agreeable interviews with Mr. Gepp at the British Museum, Dr. Dixon, Mr. Wright at Kew, and Dr. Braithwaite, and these form some of the pleasantest memories of the trip.

Hartford, Conn.

LICHEN NOTES No. 15.

Remarks on Some *Cladonia* Species.

G. K. MERRILL.

Dr. J. Müller in the Regensburg Flora, 1878, p. 482 is inclined to believe that *Helopodium capitatum* Michaux Flor. Amer. Bor. II p. 329 is synonymous with *Cladonia leptophylla* (Ach.) Flk. As it is not definitely settled if it be *Cl. leptophylla* or only something that resembles it, that Wainio and others have recognized in the material sent them from this country, one wonders if the plant of Michaux may not as well be referred to *Cl. mitrula* Tuck. Floerke in his Monograph and Nylander in Synopsis seem disposed to regard the form as associable with the Cocciferae, presumably because of Michaux's indication that the apothecia were "rubiginosa-rufis," but Acharius referred the plant to that section which includes *Cl. botrytes* and *Cl. leptophylla*, both of which have light colored fruit, and seems not to have questioned Michaux's assignment of it to Helopodia. It is very probable that Acharius had no knowledge of *Helopodium capitatum* derived from an examination, prior to his work on Muhlenberg's collections. Indeed the evidence of his ever having seen the form is negative. Coemans (Clad. Achariana) states that no specimen of *H. capitatum* is to be found in the Acharian herbarium, and adds that the plant must be regarded as problematical.

The following is a free translation of the earliest description of *H. capitatum*: Thallus foliaceous, imbricated, above sordid-olivaceous, beneath grayish-white; podetia simple, or rarely with the apices shortly divided, sub-stramineous; apothecia solitary or conglomerate, sub-globose "rubiginosa-rufis." Aside from the color of the podetia and apothecia the description answers very well for that of *Cl. mitrula*. Specimens of *Cl. mitrula* with straw-colored podetia and reddish apothecia are sometimes seen, but the characteristic color for the latter is from flesh through reddish-brown to brown. A single example of *Cl. mitrula* might be selected from an extended series with very light colored podetia and rufescent fruit, agreeing in all other respects with the description of Michaux, but no specimens have yet been examined by the writer which were possessed of distinctly red apothecia. There are three considerations pointing toward the equivalency of *Cl. mitrula* with *Helopodium capitatum*. The first is the general agreement of *Cl. mitrula* with the description of Michaux's plant. The second lies in the fact that while Schweinitz, Ravenel, Curtis and Green have examined the Carolina region with considerable thoroughness, and *Cl. mitrula* has at least been collected by the last three, no worker examining their material has discriminated *Helopodium capitatum*. Lastly, certain European authorities profess to find *Cl. leptophylla* represented in material coming to their notice and originating in America, when such passes with our own students as unquestionable *Cl. mitrula*. It is improbable that the plant of Michaux has been overlooked in the field, for judging by his list the old botanist only collected and recorded the more conspicuous lichens.

Searching for a reason why Müller, Wainio and others have saluted certain examples of our *Cl. mitrula* as *Cl. leptophylla*, the curious discovery is made that while the *Cl. leptophylla* of England, where it was first found, is totally unlike *Cl. mitrula* in any stage of its growth, the *Cl. leptophylla* of continental Europe approximates in many particulars juvenile conditions of our plant. This resemblance extends to the convexity and shape of the thalline scales, stature (small forms of *Cl. mitrula* only) costate and fissured podetia, the occasional short branched apices, color of the podetia, and the cortical character and color of the podetia in rather a less degree. With hydrate of potash *Cl. leptophylla* affords the same puzzling and discrepant reactions to be noted with *Cl. mitrula*. Of *Cl. leptophylla*, Wainio, Sanstede, Parrique, Aigret and Boistel, state the reaction to be KHO+faint, on the other hand Crombie, Leighton, and Olivier record that none is observable. This might be taken to indicate that there are two states of *Cl. leptophylla*, one KHO+ and the other minus; if so it is noteworthy that England where the plant was discovered furnished the negative. It may be mentioned here that these forms of *Cl. mitrula* nearest to the European *leptophylla* have in our experience failed to respond to KHO. Like all Cladonia species *Cl. mitrula* is very protean. Simulating as herein mentioned in its juvenile conditions *Cl. leptophylla* of Continental Europe, it varies to imitate *Cl. cariosa cribosa* (Wall.) Wain. and in those plants furnished with a verrucose cortex very much resembles *Cl. cariosa corticata*

Wain. Reduced states have been mistaken for *Cl. caespiticia* (Pers.) Flk., *Cl. botrytes* (Hag.) Willd., and a specimen without visible thallus reposing in my herbarium was so named by its collector (and he was no novice), *Baeomyces rosus*. *Cl. mitrula* is represented in my herbarium by forty-seven specimens, from as many different localities. I possess examples from Texas, Nebraska, Iowa and No. Dakota as a western limit, and every State on the Atlantic seaboard from Florida to Massachusetts and from many stations within the area thus bounded. I have not found it in Maine, and it seems to be rare in British America. Cuban specimens examined, but identified by others, have an enormously developed thallus and represent an extreme variation for the plant deserving recognition by name.

Rockland, Maine.

CHARLES R. BARNES AND JULIUS RÖLL'S COLLECTION OF MOSSES IN NORTH AMERICA.

By E. J. HILL.

In the obituary notice of Charles Reed Barnes in the May number of THE BRYOLOGIST most of his contributions to American bryology are mentioned. But there is one I have not seen noticed in such a connection. This, with additional bibliographical and historical matter, gives the occasion for the following statements.

In 1888 and 1889 a collecting trip to North America was made by Dr. Julius Röhl, of Darmstadt, Germany. It was under the patronage of Dr. G. Dieck, proprietor of a school of forestry at Zöschen, in Merseburg. At New Bremen, Ohio, he was joined by Mr. C. Purpus, and in Manitoba by Mr. M. Riss. These collected insects and the higher plants, Dr. Röhl giving his time chiefly to the cryptogams, the mosses especially. The states in which collections were made are New York, New Jersey, Indiana, Illinois, Wisconsin, Minnesota, North Dakota, Montana, Wyoming, Idaho, Oregon, Washington and British Columbia. New York is scarcely cited in the published account; New Jersey at New Durham, mainly for sphagna, in which Röhl is a specialist. The collecting ground in Indiana and Illinois is the region bordering Lake Michigan from the dune locality at its south end, whose peaty areas abound in sphagna, to the dune locality north of Waukegan, Ill. In Wisconsin, Milwaukee, and Princeton on Fox River were the main centers for collecting. It is stated that most attention was bestowed on the west coast and the Cascade Mountains (Vancouver Island, Washington and Oregon), the Rocky Mountains in Idaho, Wyoming and Montana, and the region of the Great Lakes in Indiana, Illinois and Wisconsin, the greater part of citations of localities being from these areas.

Eighty-one species of Lichens were collected, assigned to Dr. J. Müller, of Genf, and published in the Regensburg Flora, 1889. The new species, varieties and forms of mosses were first published in the Botanisches Centralblatt of Uhlworm and Kiohl, Vols. 44 and 45, 1890, 1891, under the general title: Vorläufige Mittheilungen über die von mir im Jahre 1888, in

Nord-Amerika gesammelten neuen Arten, Varietäten und Formen der Laubmoose, Torfmoose und Lebermoose. This was afterwards included in an article in *Hedwigia*, with considerable more matter added in explanatory notes, discussions of geographical distribution and other kindred topics, together with a complete list of all the species of mosses collected and their respective localities. This is entitled, *Nordamerikanische Laubmoose, Torfmoose und Lebermoose, gesammelt von Dr. Julius Röhl in Darmstadt* (*Hedw.* 32:181-321. 1893). As a Separat-Ausdruck aus "*Hedwigia*," 1893, Heft 4, it may be obtained in a thin volume, and is the one I use in work with the mosses of the region.

The material obtained was divided for work among several bryologists, mostly specialists in some of the groups their labors covered. The *Hepaticae*, about 35 species, were elaborated by Dr. Stephani, of Leipzig. Two new species were made, *Madotheca Roellii*, Kitchelos Lake, Cascades, Wash., its range since considerably extended both north and south,* and *Marchantia Oregonensis*, Mount Hood, Oregon. This is not considered specifically distinct by Dr. Marshall A. Howe in his *Hepaticae and Anthocerotae of California* (*Mem. Torr. Bot. Club*, 7: 62. 1899), but only a peculiarity of *M. polymorpha*, as the distinctive character adduced, mainly the spiny and toothed appendages of the ventral scales, are not held to be of specific worth. Dr. Röhl naturally had the *Sphagna* for his part, taking occasion again to bring out his views of grouping them in a natural series of forms and varieties under certain specific heads, mainly those most commonly recognized. Twenty-seven new varieties were made, and a numerous progeny of forms, very bewildering when one tries to match them with specimens. One feels that a new set would do just as well for almost any region. Röhl's contribution, with two plates in illustration, takes up a fourth of the article in *Hedwigia*.

The other mosses, Laubmoose or Leaf-mosses, as the Germans call them, have 27 new species, 3 new subspecies and 17 new varieties. These will be found incorporated in the appendix to the "Analytic Keys to the Genera and Species of North American Mosses," by Barnes and Heald, Madison, Wis., 1896, except the new varieties of *sphagna* made by Dr. Röhl. The *Pleurocarpi* were assigned to Renauld and Cardot. In the *Acrocarpi* Dr. Carl Müller, of Halle, had the *Grimmiaceae*, Dr. Venturi, of Trent, the *Orthotricheae*, Dr. Brotherus, of Helsingfors, the rest, except such as fell to Professor Barnes, then at Madison, Wis. These comprised the schizocarpous genus *Andreaea*, all the *cleistocarpi* and the groups *Weissiaceae*, *Leucobryaceae*, *Fissidentaceae*, *Ceratodontaceae*, *Eustichiaceae*. The bibliographical record for Prof. Barnes is, *Hedw.* 32:195-203. 1893. Three new varieties of *Dicranum Bonjeani* De Not (*D. palustre*, La Pyl, of the Manual), were all that were added by him, var. *Schlottheimeri*, Oregon, Washington, Wyoming and Idaho; var. *Roellii*, Vancouver; var. *alatum*, Chicago, Ill. These appeared in *Bot. Centralb.* 44: 386. 1890. With the exception of *Bryum Knowltoni* Barnes,* from Newfoundland, they are, as

*See under *Porella Roellii*, Steph. Mem. Torr. Bot. Club, 7: 165. 1899.

*Bot. Gaz. 14: 44. 1889.

far as I am aware, the only additions to systematic bryology in the way of new species that he made. In fact he was rather conservative in his views of species-making, being averse to divisions along lines of minute distinction. In his explanatory note in connection with *D. Bonjeani* in Hedwigia, he says; "I have not deemed it worth while to describe the forms of *D. palustre*, since they are connected with the swamp forms of *D. scoparium*. If one did this he would be able to rival the lists of individual sphagna." He is contented with a diagrammatic scheme showing the relationship of his three varieties and others of American or European origin, with *D. scoparium*, *D. Bonjeani* and *D. undulatum*.

Aside from the interest in this little volume to me as a helpful companion in the familiar collecting ground of my home region, as well as to some extent in the neighboring state of Wisconsin, I prize it also as showing that Prof. Barnes was deemed worthy of association in the elaboration of Röll's collection of mosses with some of the most distinguished contemporary bryologists of Europe.

Chicago, Ill , May, 1910.

MOSSSES OF COOK COUNTY, ILLINOIS.

BY WILLIAM WIRT CALKINS.

The following species of mosses growing within a radius of ten to twenty-two miles from Chicago have been collected by the writer during the last two years. The surface of Cook County being mainly prairie lands, cut through here and there by small streams or creeks, is not especially adapted to the growth of mosses; however, narrow belts of timber border the water-courses, and in several localities the silurian limestone outcroppings afford congenial substrata for the propagation of some species, as, also, of several species of lichens. On the Lake Michigan shore, north of Chicago twenty-two miles, high bluffs of clay extend for several miles; these are from eighty to one hundred feet in height, are clothed with various trees, shrubs and grasses, and slope off rather abruptly to the shore. A number of ravines have been cut by water down through the bluffs and these sustain a primeval forest growth. Many rare plants are peculiar to these habitats and do not occur inland. The conditions here are favorable to mosses. The writer has not thus far explored fully the localities named and probably many other species than those named herein will be found. My friend, E. J. Hill, so well known as an eminent botanist, estimates the Cook County species of mosses at about fifty. It will be seen that I have located that number. My excuse for publishing the list now is, that I believe no enumeration has ever been made, hence, that my list will be of some value, and locally at least, call attention to this branch of our flora. I being only an amateur in the study of mosses, have had all species determined by competent authorities in order to give more value to the paper. It gives me pleasure to state my sense of obligation to the following: Mrs. Annie Morrill Smith; Miss Edith A. Warner; Mrs. Elizabeth M. Dunham; Miss Alice L. Crockett; Mrs. B. J. Handy; Prof. E. B. Chamberlain; Prof. E. J. Hill; Mr. C. C. Kingman; Rev. H. Dupret; Dr. Le Roy Andrews; Prof. N. L. T. Nelson; Mr. F. E. McDonald and Dr. Brenckle.

1. *Hypnum aduncan* Hedw.
Abundant in ditches and in woods, on earth. Berwyn, collected June 17, 1908.
2. *Hypnum Boscii* Schw.
On old logs in ravine at Glencoe on lake shore, July, 1909. So far not common.
3. *Hypnum Haldanianum* Grev.
On clayey substrata in ravine. Glencoe, July, 1909. Abundant.
4. *Hypnum hispidulum* Brid.
In clayey soil in ravine, Glencoe, July, 1909. Abundant.
5. *Sphagnum compactum* DC.
Collected in low swampy woods near Berwyn from July to Sept., 1907-8-9; in fruit, abundant, and an elegant species. No other locality known to me.
6. *Sphagnum acutifolium* Warns. var. *Schimperii* Warns.
The var. *viride* appears to be the same. Locality the same as No. 5, but less common, only one clump being found last year. Not seen in fruit.
7. *Ceratodon purpureus* (L.) Brid.
On sandy soil, abundant everywhere from May to August.
8. *Amblystegium Kochii* Schimp.
On earth, border of woods. Berwyn, May 23, 1908. Not abundant.
9. *Amblystegium serpens* (L.) B. & S.
Abundant throughout, on old logs in woods and very fine. Glencoe, etc., July, 1909.
10. *Amblystegium varium* (Hedw.) Lindb.
On soil, Berwyn and the "Sag." Substrata Trenton limestone. Collected from May to Sept. 1909.
11. *Amblystegium confervoides* B. & S.
Super saxum calcareum, collected at "Sag.," Sept. 9, 1909.
12. *Brachythecium salebrosum* (Hoffm.) B. & S.
On decayed logs, Glencoe and Berwyn. Abundant, July to Nov. 1908-9.
13. *Brachythecium oxycladon* (Brid.) B. & S.
On old logs, Glencoe, July, 1909.
14. *Brachythecium oxycladon* var. *dentatum* (L.) Gr.
On decayed log, Glencoe, July, 1909. Scarce.
15. *Brachythecium acuminatum* (Hedw.) Kindb.
On old logs, Glencoe, Berwyn, July, 1909. Abundant.
16. *Thuidium recognitum* (Hedw.) Lindb.
On clay substrata in ravine, Glencoe, Berwyn, May, July, 1909. Very abundant.
17. *Thuidium delicatulum* (L.) Mitt.
On decayed logs at Glencoe. Abundant in Nov. 1908-9.

18. *Climacium Kindbergii*, R. & C.
On old logs in ravine at Glencoe, not abundant. Oct. 1908.
19. *Hylocomium triquetrum* B. & S.
On decayed logs in ravine, Glencoe, Oct. 1908.
20. *Weisia viridula* (L.) Hedw.
On poor soil around grass roots, border of woods, near Berwyn. Collected May 14, 1908. So far not found elsewhere.
21. *Funaria hygrometrica* (L.) Sibth.
On soil in meadow, also on ash deposits. June 17, 1909. Abundant.
22. *Dirichum pallidum* Sulliv.
On clay soil in Oak barrens, Berwyn, June 15, 1908. Not abundant.
23. *Pohlia nutans*, Lindb.
In open oak woods at roots of trees, Berwyn, June 18, 1909. Abundant.
24. *Physcomitrium turbinatum* (Mx.) Brid.
On earth throughout, abundant and fine. Collected June, 1908-9.
25. *Dicranella heteromalla* (L.) Schimp.
On sandy, clayey soil in open oak woods near Berwyn. Found around oaks and often intermixed with *Leucobryum glaucum*. I have never seen this in any other locality. Quite abundant.
26. *Dicranella varia* (Hedw.) Schimp.
This elegant species is abundant at Glencoe on clay bluffs facing the lake and grows hidden among and around grass-roots. Also, intermixed with this will be found Nos. 41 and 42. All these species have been examined critically by three of our most eminent bryologists. Collected in October, 1909.
27. *Bartramia pomiformis* (L.) Hedw.
On old log in ravine at Glencoe. So far but little found. Collected Nov. 2, 1908.
28. *Aulacomnium palustre* Schw.
On barren clay soil in open oak woods, Berwyn. Abundant. May and June, 1909.
29. *Philonotis fontana* (L.) Brid.
Found around grass-roots on clay bluffs at Kenilworth. Exposure to the lake direct, and the species seems to be confined to about one rod in length. Not found elsewhere. Collected in July, 1908-9.
30. *Anomodon attenuatus* (Schreb.) Huebn.
On decayed logs and on earth in ravines at Glencoe in Nov. and July, 1908. Abundant.
31. *Mnium cuspidatum* Hedw.
Abundant on clayey soil, sides of ravines at Glencoe, also found at Berwyn. (= *M. sylvaticum* Lindb.).
32. *Eurhynchium strigosum* (Hoffm.) B. & S.
On old logs in ravine, Glencoe. Collected Nov. 1908. Also in woods near Berwyn.

33. *Eurhynchium hians* (Hedw.) Jaer. & Sauer.
On decayed log at Glencoe, October, 1909.
34. *Leskea polycarpa* Ehrh.
On *Salix nigra*, Berwyn, intermixed with other species. Also rarely found at "Sag," twenty-two miles south. Dupret, detr. Collected July, 1909.
35. *Leskea gracilescens* Hedw.
On bark of living elm at Glencoe, rare. Collected July, 1909.
36. *Leskea obscura* Hedw.
Abundant on *Salix nigra*, Berwyn. Collected from June to August, 1908-9. These three species of *Leskea* have caused my correspondents some trouble to determine, No. 36 being called as above, but a depauperate form.
37. *Polytrichum commune* L.
On wet, marshy ground amid shrubs of *Vaccinium*, *Gaylussacia*, *Pyrus*, and matted in with abundant *Drosera* and *Sphagnum*s. Berwyn. Collected in May and July, 1908-9.
38. *Polytrichum commune* var. *uliginosum*, Huebn.
In same locality as the preceding species.
39. *Polytrichum Ohioense* R. & C.
On poor clay soil in Oak Barrens, Berwyn. Very abundant.
40. *Platygyrium repens* (Brid.) B. & S.
On clayey soil in ravine at Glencoe. Collected July 9, 1909. Scarce so far.
41. *Barbula unguiculata* (Huds.) Hedw.
On clay bluff at Glencoe, growing hidden around grass-roots; confined to limited space. Collected in July and October, 1909.
42. *Burbula fallax* Hedw.
Habitat same as that of No. 26. Glencoe, intermixed with the *Dicranella varia* and probably abundant detached. Oct. 1909.
43. *Bryum caespitium* L.
Occurs at "Sag." Super saxum calcareum; also near Berwyn, same substrata. Can be called rare here.
44. *Thelia asprella* (Sch.) Sulliv.
On *Ulmus*, base of tree in ravine at Glencoe. Rare thus far. Collected Nov. 2, 1908.
45. *Leucobryum glaucum* Sch. var. *albidum* Brid.
On clayey, sandy soil in Oak Barrens near Berwyn. Have never seen it in fruit. *Dicranella* and *Polytrichum* intermixed slightly. There are acres of it. Collected from April to Nov. 1909.
46. *Catharina angustata* Brid.
On sandy poor soil, in abundance near Berwyn. Collected Sept., Oct. 1909.

47. *Rhynchostegium serrulatum* (Hedw.) B. & S.
Super saxum calcareum at "Sag." Sept 1909. Also at Glencoe on fallen log, July, 1909. Rather common.
48. *Orthotrichum strangulatum* Beauv.
On *Salix nigra* trees in several localities in Cook County. Collected by E. J. Hill—not as yet by myself here.
49. *Entodon seductrix* (Hedw.) C. Müll.
Collected July, Sept 1909, on rotten log near Berwyn; also at Glencoe and "Sag."
50. *Amblystegium orthocladon* Beauv.
On old logs in ravine. Glencoe. Collected May 24, 1910. Det. Dupret.
51. *Hyphnum chrysophyllum* Brid.
On old log. Glencoe. Collected May 24, 1910. Det. Dupret.
Berwyn, Illinois.

ADDITIONS TO THE LICHEN-FLORA OF SOUTHERN CALIFORNIA, No. 4.

BY H. E. HASSE.

RAMALINA EVERNOIDES Nyl.

Thallus compressed, suberect or subpendulous, light straw color above, paler beneath, both surfaces flattened reticulate lacunose, becoming smoother above, from a broad base soon dividing into lobes that are irregularly sinuate and lacinate in upper part, the laciniae often marginally sorediate torn, 1 to 2.75 cm. high, the cortical hyphae are perpendicular to the thalline axis beneath which is the well developed layer of longitudinal hyphae, containing the gonidia; no fruiting plants have been seen.

On shrubs at Point Loma near San Diego and also at Newport, Orange County.

LECIDEA (sect. *Biatora*) SANGUINEO-ATRA Th. Fr. *Biatora sanguineo-atra* (Fr.) Tuck. : Tuck. Syn. II, 21, 1888.

Thallus of medium thickness, light greenish-gray, pale green when moist, forming a coralloid-granular crust running over moss, the granules becoming dispersed at the periphery of the crust, KHO-; apothecia sessile, 0.5 to 1 mm. wide, disk flat, dark reddish brown and red-black, surrounded by a concolorous, obscure, entire proper margin that at last disappears and the disk then slightly convex; epithecium subcontinuous, light grayish-yellow; thecium pallid to nearly colorless, 68 μ to 96 μ high; paraphyses closely coherent, slightly thickened and faint yellow above; hypothecium sordid brownish, darker than the epithecium; asci clavate, reaching up to the epithecium, 8-spored; spores ellipsoid and oblong-ellipsoid, one or both ends acuminate, 8 μ to 17 μ long, 4.5 μ to 7 μ thick; Jod. stains the hemin. gel. blue then dark red-brown, no change with KHO except a slight darkening of the natural colors.

On a shaded moss covered boulder, Topanga Cañon, Santa Monica Range.

Lecanora (*Squamaria* Nyl.) **marginalis** Hasse sp. nov.

Thallus monophyllus, white and finely white pruinose above, roundish or flexuous in outline, 0.75 to 1.5 cm. in diameter, at the center about 0.5 mm., but increasing somewhat in thickness toward the circumference, umbilicately attached to the substratum at the center; upper surface smooth or rugulose-warty and at the periphery becoming convolutely folded, beneath tawny flesh colored, destitute of rhizinae; the upper cortex is composed of several layers of perpendicularly arranged brown cells, bleaching with KHO, beneath this is the gonidial layer, the subtending medulla has horizontal, delicate, about 1μ thick, closely interwoven hyphae, the inferior cortex shows several layers of large round cells; thallus KHO^+ yellow, $\text{Ca (Cl. O)} 2^-$; apothecia adnate, all marginal, a few or more to each frond and then crowded and deformed from pressure, 1.5 mm. to less in diameter, the periphery of the frond is often revolute, the apothecium facing toward the substratum, disk black, thickly pruinose, rarely naked, concave to flattish and wavy, the turgid thalline margin coarctate, flexuose and often diffomed by juxtaposition: epithecium subcontinuous, dull brown blackish; thecium colorless or light ochraceous, 48μ to 52μ high; paraphyses stout, 2μ thick, coherent, separating after KHO, scarcely thickened above; hypothecium of coarse cells and of the same hue with the epithecium; asci clavate and inflated clavate, 48μ high, 10μ to 22μ thick; 8-spored; spores globular to ovoid-ellipsoid, 8μ in diameter to 9μ to 14μ long, 6.5μ to 8.5μ thick, epispore thin; all himen. structures stain deep blue with Jod.; KHO bleaches the epithecium a pale steel blue: the bright green gonidia are 12μ to 23μ in diameter; spermogones indicated by generally numerous minute black dots, immersed, globular, spermatia acicular, curved, 32μ to 40μ long and barely 1μ thick, sterigma simple, straight, attenuated above.

On shaded lava and basaltic rocks near Little Lake station, Inyo County. at 1000 m. alt. From its color a conspicuous lichen on the lower side of inclined dark volcanic rocks. Type deposited with Rev. C. H. Demetrio and in herb. Hasse, Sawtelle, California.



J. Renauldy

BIOGRAPHICAL SKETCH OF MONSIEUR RENAULD.

I. THÉRIOT.

Ferdinand Renauld was born on 18th November, 1837. He was educated at the College of Vetoul and at the Lycée of Dijon. He enlisted in a Spahi Regiment on 27th December, 1856, and serving in several cavalry regiments, worked his way up through the various ranks. But fever, contracted in Algeria, seriously undermined his health and hindered him in his career. He retired upon his pension as Captain in 1887, and was appointed Commandant of the Palace of Monaco the following year, which office he resigned in 1892.

F. Renauld obtained several honors and distinctions: "Chevalier de la Légion d' Honneur" in 1884, "Officier d' Academie" in 1881, "Officier de l'Instruction publique" in 1884. In 1895 the "Academy of Science" gave him the Montagne Prize for his "Prodrome de la Flore Bryologique de Madagascar," and in 1905 the Detmazières Prize for his "Essai sur les Leucoloma." He was correspondent of the Museum and a member of numerous learned societies. He died in Paris on the 6th May, 1910, after a long, painful illness, which he bore with admirable courage. His memory will be perpetuated in the Science of Bryology by the genus "Renauldia" which Carl Müller named after him in 1891.

The death of F. Renauld is a great loss to the bryological world in which he occupied an important position. He devoted nearly forty years of his life to Bryology, a science which he passionately loved. His first publication "Aperçu phylostatique sur le département de la Hte. Saône" dates as far back as 1873. The following year he wrote his first article for the "Revue Bryologique," a review recently started to which, with the greatest zeal, he continued to lend till his death his most valuable co-operation.

On glancing at the important work of F. Renauld, one is astonished at the variety of the subjects which he has treated and the importance of the studies with which he has enriched bryological science.

First of all, he studied the flora of the countries where he lived, or which he frequented, the upper Saône; the Pyrénées; but this field was too narrow for his wonderful activity and so, from the year 1885, either alone or with his co-adjutor, Jules Cardot, he entered upon the study of exotic flora. His researches have special bearing upon North America and Africa (Madagascar, and the neighboring isles, of the Congo, and the Canaries), and the result of his enquiries has been recorded in books which excite the admiration of all those interested in the science of Bryology.

I will only briefly refer to the works which were prepared in conjunction with J. Cardot, not because their value is less, but because my friend, J. Cardot, influenced by a feeling of delicacy which all will understand, did not wish to undertake to draw up this eulogy of him, who has disappeared from this world, would blame me for not laying stress upon those of his works, which Renauld conceived and developed without assistance. I cannot, however, forbear laying stress upon the happy results of this co-operation of nearly a quarter of a century, for when this project of work, to be done in

common by two scholars separated one from the other by several hundred kilometers, was made known, an illustrious-fellow scholar could not refrain from showing his surprise and expressing his doubts as to the success of such an association. Now, contrary to these pessimistic forebodings, the association, "Renauld and Cardot," formed for scientific purposes, has produced a considerable number of species, of good species which will leave to the sieve of criticism but an unimportant waste, much smaller than may be found in the work of other bryologists of repute.

It is right to say that in associating himself with J. Cardot, Renauld did a happy thing, and that the pupil whom he trained, has become one of the uncontested masters of the science of Bryology.

Renauld and Cardot have added to the knowledge of North American flora a quantity of new information. They have signed some important works on the flora of Costa-Rica, of the Congo, of the Canary Islands, without mentioning the valuable documents contained in the "*Musci exotici novi*," published 1890-1903 (ten fascicles), which relate to the entire flora of the globe. Seven genera and more than 400 species bear the signature: "Ren. et Card.," this large number is the best proof of the excellence of this co-operation.

Those who seek the personal touch of the scientific spirit of F. Renauld will find it in the "*Prodrome de la Flore Bryologique de Madagascar des Mascareignes et des Comores*" (1897), followed by a supplement which appeared in 1909, and in his "*Essai sur les Leucoloma*." The first is a work of the greatest importance on the flora of the South African islands. There already existed a short account of this flora that Bescherelle had published in 1880 under the title, "*Flore bryologique de la Reunion*," but the documents and the materials which Renauld was able to procure enabled him to compose a monumental work on the bryological flora of this region.

This work is a work of indisputable scientific value that bryologists will always consult with profit and interest.

The work on the "*Leucoloma*" that our friend, too modestly, entitled, "*Essai*," reveals to us his method of work, the loftiness of design and his enlightened conception of natural facts. The genus, *Leucoloma*, which had hitherto only been a desultory grouping of a small number of species has become, thanks to his thoughtful researches and sure judgment, a natural group in which the bryologist moves freely, easily finding his way in spite of the extension Renauld was able to give it. If his "*Essai*" could not for want of material and time, develop into a complete account, he has at least greatly facilitated the future preparation of this complete account, and moreover, I am sure that bryologists will often consult this essay for the wisdom that Renauld's long experience has introduced into it and the scientific method which inspired him. Here it seems to me well to mention that the publication of these works of Renauld: "*Prodrome*;" "*Supplement*;" "*Essai sur les Leucoloma*," has been assured by the great generosity of Son Altesse Sérénissime, le Prince de Monaco.

Ferdinand Renauld completed his bryological studies with some valuable

illustrations. Like all those who practice descriptive science, he had recognized a great many times that descriptions, even when most complete, most precise (and how many there are that are neither precise nor complete), leave the enquirer perplexed with regard to the exact sense of the terms employed. He had arrived at the conviction that nothing throws more light on the text than a figure, even if roughly drawn and destitute of any artistic merit provided that it be exact.

That is why he associated himself with the greatest eagerness in the gigantic work undertaken under the direction of M. Grandidier, "*Histoire physique, naturelle et politique de Madagascar*," undertook to sketch for this work the mosses of Madagascar. The work is not yet finished, but, even so, it represents an important part of the bryological flora of Madagascar; 163 plates in quarto, have appeared, of which 130 are the exclusive work of Monsieur Renauld. Those who have gone through this folio have been able to convince themselves of the scientific value of the drawings, of their precision and of the great importance of their bearing on the study of certain groups, which present great difficulties to a bryologist. We must also mention the 24 beautiful plates, which accompany the Supplement of the "*Prodrome*" and "*Essai sur les Leucoloma*."

So much for the scholar. Whilst fulfilling scrupulously his professional obligations, and remaining an affectionate and devoted head of his family, he was able to produce the work of which we have just made a rapid sketch. The physiognomy and the character of the man are not less noteworthy than the work of the scholar. One could not approach F. Renauld without being attracted by his handsome and noble appearance, by his smiling and sympathetic welcome, and without feeling for him keen affection and respectful admiration. Everything about him spoke of his kindness, and of the delicacy of his feelings, and his innate goodness was reflected even in his correspondence. For many years I had known him by his kindness and indulgence and when, later, I had the good fortune to meet him in Paris, I experienced no surprise, for I found him such as I had always pictured him to myself. It seemed to me that I had known him for a long time and that I was meeting an old friend. His passion for bryology joined to his natural goodness of heart, portrays him as one interested in young people—in beginners. While selfish minds are irritated by the sight of young volunteers working at their side in the scientific field and wishing to make it their own sphere of work, *he* would act as their guide, helping them and encouraging them, giving them advice and the use of his own collection, finding for them an unexplored territory and a new mine to work, rejoicing always in their success. I will quote the instance of Jules Cardot who recently wrote to me:

"I have profited by the experience that Renauld already possessed as a bryologist; without his co-operation and encouragement, I think I never would have dared to enter upon the study of exotic bryology."

I look upon it as a religious duty here to recall also what I myself owe to F. Renauld. It was he who suggested to me the idea of preparing the

Revision of the bryological flora of New Caledonia. It was he who put me in communication with an active and enthusiastic collector, Mons. Franc. I knew also that in order to facilitate my task, he made use of his scientific connections and of the great consideration in which he was held by begging his fellow-workers to give me their very kind co-operation together with materials for work. Is not this care in enlisting recruits and drilling them in scientific methods, the mark of a truly scientific mind? His fine character, the uprightness of his judgment, his open and tolerant spirit, his kindly and genuine bearing towards all those with whom he came in contact were unanimously appreciated. No discordant voice was raised around the tomb of our regretted friend. All those who approached him, all his co-workers applauded the opinion expressed by V. F. Brotherus: "Our friend F. Renaud is one of the noblest men I have ever known." This appreciation of the great master of contemporary bryology truly and forcibly sums up the personality of the friend of whom my feeble pen has only been able to draw an imperfect portrait.

Havre, France.

For Bibliography see page 125.

SPLACHNOBRYUM IN GREENHOUSES.

BY ELIZABETH G. BRITTON.

Mosses of this genus have been known to occur in greenhouses since 1867 when specimens were found by D. Orr in the Botanical Gardens at Glasnevin, Dublin, Ireland, on brick walls in a hot house, which were referred to a West Indian species, *S. Wrightii* C. M. *Splachnobryum Corbieri* R. & C. was described in 1902 from specimens found at Cherbourg, France, in a greenhouse, but this species is supposed to be of African origin, and the specimens bore no fruit, only antheridia.

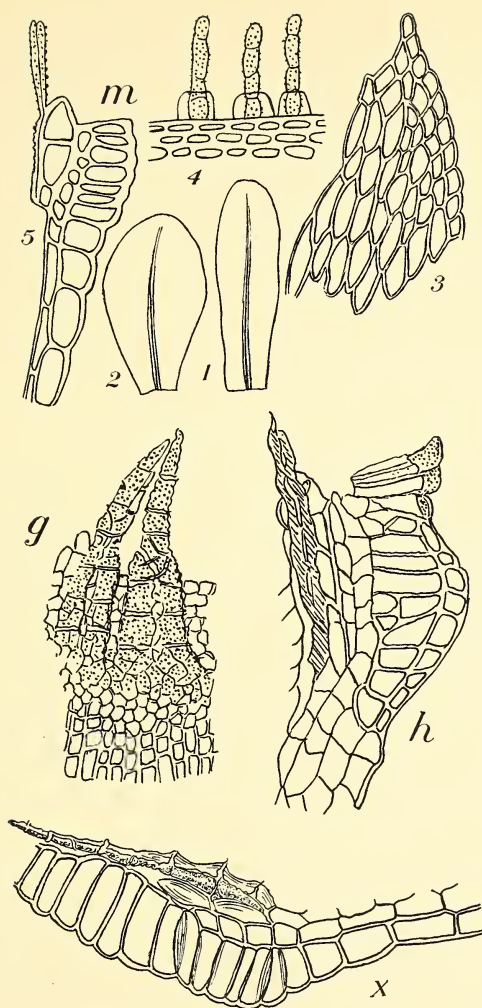
On January 9th, 1908, I found in the greenhouses of the New York Botanical Gardens¹ some specimens of a *Splachnobryum* growing on pots with West Indian orchids. These specimens were fruiting, though the capsules were rather old, the plants quite black, discolored and overgrown with minute algal filaments.

Last year Miss Edith A. Warner brought some fine specimens sent to her by Dr. A. F. K. Krout for naming; they grew on wet stones and rocks in greenhouses in the vicinity of Philadelphia and were collected in good fruiting condition on October 2, 1909. They proved to be a species of *Splachnobryum* closely related to, if not identical with, one described by Dixon² as *S. delicatulum* Broth. (Plate XI, Figs. 1, 2, 3, 4, 5.)

In figs. 4-5 of Plate XI the short hyaline preperistome is figured extending downward inside the flaring rim of the capsule with from 5-9 rows of cells, making half of each tooth immersed, and the walls of the mouth of the capsules very dark and thickened. The specimens from which these drawings were made were collected on brick walls of hot houses, at Baldersley Park, Yorkshire, in October. Dixon states that this species, "*Splachnobryum delicatulum* Broth., was probably introduced among orchids from tropical America, as mosses of this genus occur in temperate regions only as aliens."

1. A rare moss in the Conservatories. Journ. N. Y. Bot. Gard. 10: 140. 1909.

2. "A new species of *Splachnobryum*, with notes on the peristome," by H. N. Dixon Journ. Bot. 45: 81-85. t. 484. 1907.



EXPLANATION OF PLATE XI

- Splachnobryum delicatulum* Broth., Journ. Bot. 44: 81. t. 484A. 1907.
 1, 2. Leaves, $\times 25$. 3. Cells in upper part of leaf, $\times 125$. 4. Portion of peristome, viewed from without $\times 125$. 5. Longitudinal radial section of capsule-wall and peristome, $\times 125$.
Splachnobryum Geheebii Fl., Musci Fl. Buit. 2: 473. fig. 87. 1902-1904.
 Fig. g. Inner surface of peristome $\times 200$. Fig. h. Section with perforate teeth $\times 240$ showing the thickened flaring rim and intermediate membranous cells.
Splachnobryum Wrightii C.M. Fig. X. Cross-section of capsule of *Splachnobryum Wrightii* C.M. from Chas. Wright's Cuban mosses no. 54. Showing flaring rim, base of lid, peristome and inflated preperistome $\times 120$. (From drawing by Alexandrina Taylor.)

Dr. Krout's specimens show the "*hyaline preperistome*," deeply inserted, fragile, papillose teeth and blunt leaves. They were compared with the description of *S. delicatulum* Broth. and proved to be exactly like the English specimens in the leaves and inflorescence and the blunt stumps of the preperistome are also present, but Mr. Dixon thinks that the walls of the capsules, have larger cells and the spores also are larger in our specimens. The fragile and peculiar peristome differs from the figures and description given by Brotherus³ for *S. Wrightii* C. M. in the presence of the basal hyaline cells, of which Dixon states: "Even now I am quite unable to say whether the structure in question is peculiar to the plant under consideration, or whether it may be shared by some other species of the genus." Since this description was published Prof. Max Fleischer has called Mr. Dixon's attention to the fact that this "*binding membrane*",⁴ as he called it, is present in *S. Geheebii*⁵ which he figured and distributed from the East Indies. (Plate XI Figs. g and h.)

Brotherus also has changed his mind about the generic position of *Splachnobryum* and has transferred it from the *Pottiaceæ* where he placed it in 1902, back to the *Splachnaceæ*⁶ where Dixon and others agree is its family relationship.

It will be of interest to add that the hyaline preperistome has been found to exist in *S. Wrightii* C. M. (Plate XI Fig. X.) from Cuba and Jamaica, in *S. Mariei* Besch from Guadeloupe, in *S. Wulfschlagelii* C. M. from Surinam and in *S. Bernoullii* C. M. from Guatemala. I have also found traces of it in *S. flaccidum* (Harv.) C. M. from Asia, and in *S. Boivini* C. M. from Madagascar. It is difficult to determine its presence positively without section-cutting as the hyaline cells are very hygroscopic and as soon as the capsule is moistened the whole peristome bends inward and downward, disappearing completely out of sight. Since this genus had been found, in greenhouses both here and in Philadelphia it may be of interest to describe Dr. Krout's specimens, which are better than ours and do not seem to differ specifically from

Splachnobryum delicatulum Broth.

Plants gregarious in bright green cushions; stem erect or slightly decumbent at base, seldom more than 5 to 10 mm. high with a few red basal radicles occasionally branching into green, filamentous protonema; leaves soft, flacid, erect and spreading, 1-2 mm. long, elliptic or spatulate, obtuse, costate to below the apex, margins entire or serrulate, plane or reflexed with one row of smaller, quadrate or inflated cells around the apex; basal cells oblong or rhomboidal, upper irregularly hexagonal, walls thin. Dioicous, the antheridial plants more slender with several terminal clusters becoming subaxillary; archegonia few, terminal or lateral without paraphyses. Seta erect, terminal or rarely lateral 3-4 mm. long, red below, yellow and twisted above; capsule seldom more than 1-1.5 mm. long, erect, cylindric; lid small,

3. Broth. in E. & P. Pflanzenfam. fasc. 214: 420 fig. 275. D. 1902.

4. Fleischer-Musci Flor. Buit. 2: 473 fig. 87. 1902-1904.

5. Fleischer-Musci Arch. Ind. no. 136. 1900.

6. Broth. E. & P. Pflanzenfam. fasc. 234-235: 1203. 1909.

conic. with inflated cells. mouth broad, flaring and bordered by 6-9 rows of smaller dark-red denser cells; peristome deeply inserted with a short pale-yellow inflated hyaline preperistome; teeth 16, red, papillose, short, immersed for fully half their length, rather distant, slender and fragile, incurved when moist and irregularly thickened and split; neck stomatose, tapering, calyptra cucullate, spores .013-.016 mm. slightly papillose, maturing in October.

Origin: Unknown.

Habitat: On wet stones and rocks in greenhouses in the vicinity of Philadelphia, Penn. Collected by Dr. A. F. K. Krout, October 2nd, 1909.
New York Botanical Garden.

LICHENS OF THE MOUNT MONADNOCK REGION, N. H., No. 5.

(See BRYOLOGIST, July, 1909. Vol. XII, No. 4.

BY R. HEBER HOWE, Jr.

Genus: *Bæomyces* Pers. DC.

66. *Bæomyces roseus* Pers. Two fertile specimens, thus labelled, belong here.

Genus: *Stereocaulon* Schreb.

67. *Stereocaulon paschale* (L.) Fr. Three fertile specimens belong here. One was labelled thus, the others "*tomentosum*" and "*denudatum*" respectively. Abundant at Fitzwilliam.
68. *Stereocaulon tomentosum* (Fr.) Th. Fr. Three fertile specimens belong here. Two were labelled "*paschale*," one as above.
69. *Stereocaulon tomentosum* var. *alpinum* Th. Fr. Two fertile specimens belong here. Both were labelled "*coralloides*."
70. *Stereocaulon denudatum* Floerk. Two specimens, one fertile, belong here. One from "Monadnoc" was labelled "*tomentosum* var. *alpinum*," the other collected by "C. C. Frost," and probably therefore not from New Hampshire, was labelled "*pileatum*."
71. *Stereocaulon condensatum* Hoffm. One fertile unlabelled specimen collected on "earth" belongs here.
72. *Stereocaulon pileatum* Ash. One specimen labelled "nanodes Keene, rare" probably belongs here. Fitzwilliam, common. One specimen labelled "*Stereocaulon nanodes?* Keene," is "not determinable, but certainly [is] not *S. nanodes*."

For the determination of the specimens of this genus I am indebted to Dr. L. W. Riddle of Wellesley College.

Genus; *Cladonia*.

The genus *Cladonia* has undergone such revision since Mr. Wheelock's day, that I have not indicated his determinations in this genus. For the determination of these plants, except where otherwise indicated, I am indebted to Dr. L. Scriba of Frankfort, Germany, who for the mere painstaking clerical labor alone, is to be admired. The arrangement of the species,

so far as possible, is according to Tuckerman as in the former papers. It must be borne in mind that though these lichens were included in Mr. Wheelock's New Hampshire collection, yet undoubtedly a number of species were inadvertently included, and are not to be attributed to this region.

73. *Cladonia cariosa* (Ach.) Spreng. Five specimens.
74. *Cladonia cariosa corticata* Wain. (= *symplocarpha* Fr.). One specimen.
75. *Cladonia pyxidata chlorophaea* Flk. Three specimens.
76. *Cladonia pyxidata neglecta* Flk. Four specimens.
- (?) *Cladonia fimbriata* (L.) Fr. One doubtful specimen.
- (?) *Cladonia fimbriata pycnothelira* Nyl. One doubtful specimen.
77. *Cladonia ochrochlora* Flk. Ten specimens, six of which are doubtfully referred here.
78. *Cladonia pityrea* (Flk.) Fr. Eleven specimens.
79. *Cladonia pityrea crassiuscula* Wain. Two specimens.
80. *Cladonia acuminata* (Ach.) Norrl. One specimen.
81. *Cladonia gracilis dilatata* Wain. One specimen.
82. *Cladonia gracilis macroceras* (a. *elongata*) Wain. Four specimens.
83. *Cladonia verticillata* Hoffm. Five specimens.
84. *Cladonia turgida* (Ehrh.) Hoffm. Eight specimens.
- 84½. *Cladonia Papillaria* (Ehrh.) Hoffm. (Mt. Monadnock. Nov. 2, 1907).
85. *Cladonia squamosa* (Scop.) Hoffm. One specimen.
86. *Cladonia squamosa denticollis* Wain. One specimen.
87. *Cladonia squamosa multibrachiata* Wain. Four specimens.
88. *Cladonia squamosa phyllocoma* Wain. Five specimens, three doubtfully referred.
89. *Cladonia squamosa murina* Scr. One specimen.
90. *Cladonia subsquamosa* Nyl. (emend). One specimen.
91. *Cladonia delicata* (Ehrh.) Flk. Two specimens.
92. *Cladonia caespiticia* (Pers.) Flk. Five specimens, three were determined by Dr. L. W. Riddle.
93. *Cladonia furcata* (Huds.) Schrad. Two specimens.
94. *Cladonia furcata paradoxa* Wain. Eleven specimens.
95. *Cladonia furcata pinnata* Wain. Six specimens. (Fitzwilliam, common.)
96. *Cladonia furcata scabriuscula* (Del.) Wain. Seven specimens.
97. *Cladonia furcata polamaeam* Wain. Six specimens.
98. *Cladonia furcata racemosa* Wain. Three specimens.
99. *Cladonia furcata racemosa* (f. *corymbosa*) Wain. Two specimens. (Fitzwilliam, common.)
100. *Cladonia furcata glaucoides* Scr. Two specimens. (Fitzwilliam, common.)
101. *Cladonia furcata truncatum* Flk. One specimen.
102. *Cladonia furcata furcata-subulata* Wain. One specimen.
103. *Cladonia rangiferina* (L.) Web. (emend). Three specimens. (Fitzwilliam, common.)

104. *Cladonia sylvatica* (L.) Hoffm. Two specimens. (Fitzwilliam, common.)
105. *Cladonia alpestris* (L.) Rabenb. Two specimens. (Fitzwilliam, common.)
106. *Cladonia Floerkeana* (Fr.) Sommf. One specimen.
107. *Cladonia Floerkeana intermedia* Hepp. One specimen.
108. *Cladonia amaurocraea* (Flk.) Schaer. One specimen.
109. *Cladonia uncialis* (L.) Web. Hoffm. Six specimens.
110. *Cladonia uncialis obtusata* Ach. Three specimens.
111. *Cladonia reticulata lacunosa* (Bor.) Wain. Four specimens.
112. (?) *Cladonia coccifera* (L.) Willd. One doubtful specimen.
113. *Cladonia coccifera pleurota* Flk. Three specimens. (Fitzwilliam, common.)
114. *Cladonia coccifera stematina* Wain. Two specimens.
115. *Cladonia digitata* Schaer. One specimen.
116. *Cladonia digitata monstrosa* Wain. Four specimens.
117. *Cladonia didyma pygmaea* Wain. Four specimens.
118. *Cladonia bacillaris* Nyl. Four specimens.
119. *Cladonia macilenta* (Ehrh.) Hoffm. Two specimens, one doubtful, determination by Dr. L. W. Riddle.
120. *Cladonia cristatella* Tuck. Seven specimens. (Fitzwilliam, common.)
121. *Cladonia cristatella ochrocarpia* Tuck. Five specimens.
122. *Cladonia cristatella vestita* Tuck. One specimen.

There were three specimens returned by Dr. Scriba as indeterminate.
Concord, Mass.

TO BE CONTINUED.

FIELD NOTES ON EPHEMERUM AND NANOMITRIUM.

GEORGE E. NICHOLS.

The writer is about to undertake a study of the North American species of *Ephemerum* and *Nanomitrium*—our only representatives of the group known as the *Ephemereae*—and for this purpose desires to obtain specimens from all parts of the country. These two genera include some of the smallest known mosses, and it is perhaps not to be wondered at that they are not overabundantly represented in herbaria. The paucity of available material is not, however, due to the scarcity of the plants, for almost without doubt one or more species may be found in any region of temperate or tropical America where there are appropriate habitats. The writer rarely takes a day's tramp in the fall without discovering one or more new stations. It is with a view to introducing these tiny plants to those moss students who are not already personally acquainted with them, and of thus obtaining more extensive material upon which to work, that the writer ventures the following brief remarks relative to their habit and field characters, time of fruiting, habitat, and range.

HABITAT AND FIELD CHARACTERS. As already intimated, all of the species of *Ephemerum* and *Nanomitrium* are very minute. The leafy shoot

of the plant consists merely of a short bud-like cluster of leaves borne on an exceedingly short stem and surrounding the diminutive capsule. The whole plant in *Nanomitrium* is scarcely more than 1 mm. in height, and even in the larger forms of *Ephemerum* rarely exceeds 2 mm. One of the most important distinguishing characteristics of these two genera, and fortunately one which facilitates their recognition in the field, is the fact that the green protonema, from which the leafy shoots arise, persists throughout the life of the plant. In many species, especially in those which, like *Ephemerum spinulosum*, grow in very damp places, this structure forms a conspicuous, dark green, felty mat, covering the substratum about the leafy shoots. It looks very much like a mass of *Vaucheria* or some other Alga, and is darker in color than the pale green protonema of *Pogonatum tenue*. Upon close examination of such a mat with a hand lens the fruiting plants of *Ephemerum*, if present, are easily distinguished. In some forms, however, e. g. *Nanomitrium Austini*, the protonema is not a conspicuous field character of the plant. Such species are to be detected only by digging up and carefully examining with a lens pieces of earth which appear promising.

TIME OF FRUITING. Both *Ephemerum* and *Nanomitrium* are annuals. In some species the entire life cycle from spore to spore is completed in less than six months. Late in summer or early in autumn the tiny, spherical capsules become distinguishable with a lens. The spores mature from late autumn to spring, so that the most favorable time for collecting the plants is from October to January.

HABITAT. In this connection the following list of localities from which some of the specimens in the writer's possession have been collected may be suggestive: "fields and gardens," "thin soil on rocks," "relatively dry, hard earth in a cart path," "lumps of earth in old corn fields," "gravelly roadsides," "river bank," "among marsh grasses on moist ground in river bottoms," "muddy bed of a dried up pond," "dry mud at the border of a cattle wallow," "clayey bottom and sides of ditch." It will be seen that their habitats are quite varied.

In general they may be looked for on any bare, earthy substratum which is not too dry the year round and which has not already been preempted by such prolific forms as *Funaria hygrometrica*, *Physcomitrium turbinatum*, *Bryum argenteum*, *Pohlia nutans*, and *P. prolifera*. They usually grow in sunny or only slightly shaded situations, and almost never in the woods. Of the habitats listed above, the last four mentioned are perhaps the most certain to repay close investigation. It is in such places that Riccias are wont to occur, and these liverworts are very frequently associated with Ephemerae of some description.

RANGE. Largely on account of their small size the Ephemerae have been so little collected that it is at present impossible to describe their distribution with any degree of accuracy. On a basis of the stations for various species thus far recorded the range of the group may be roughly defined as: Quebec to Florida; westward to Saskatchewan, Kansas, and Louisiana; and in California. Concerning the distribution of the individual species still less is

known. This is especially true of the species of *Nanomitrium*, none of which have been recorded from more than three or four stations. It is hoped that the presentation of these facts at this time will arouse interest in this group of mosses among American bryologists.

Yale University, New Haven, Conn.

SULLIVANT MOSS SOCIETY NOTES.

NOTICE—ELECTION OF SULLIVANT MOSS SOCIETY OFFICERS FOR 1911.

Members of the Sullivan Moss Society are requested to send ballots *at once* to Dr. A. J. Grout, New Dorp, Richmond Co., New York, Judge of Elections. Polls close November 30th.

For President—Dr. Alexander W. Evans, Sheffield Scientific School, New Haven, Conn.

For Vice President—Miss C. C. Haynes, Highlands, N. J., and New York City.

For Secretary—Mr. N. L. T. Nelson, Des Moines College, Des Moines, Iowa.

For Treasurer—Mrs. Annie Morrill Smith, Brooklyn, N. Y.

NEW MEMBERS.—No. 210. Miss E. Lucy Braun, 2702 May street, Cincinnati, Ohio. No. 211. Miss M. S. Clapp, 24 Salcombe street, Dorchester, Mass.

Plans for the seventh public meeting of the Sullivan Moss Society in affiliation with the American Association for the Advancement of Science are being worked out and a fine session is assured. The secretary for the meeting is Dr. G. H. Conkling, 1204 Tower ave., Superior, Wisconsin, to whom all communications should be addressed. This meeting will largely be in the hands of our western members and friends and we all know how royally the west executes all it undertakes.

As usual post cards will be sent to members giving exact date, place of meeting and other details.

FOR SALE.—“*Hepaticae Britannicae Exsiccatae*,” being a collection of one hundred specimens of British Hepaticae, including many rare species carefully prepared and named by Wm. H. Pearson, to whom subscriber's names should be sent, at 18 Palatine Road, Manchester, England. Price five dollars.

OFFERINGS FOR NOVEMBER.

(To Society Members only.—For Postage.)

- Miss Mary F. Miller, Lyonhurst, R. F. D. 4, Washington, D. C. *Cladonia cristatella* Tuck., *C. mitrula* Tuck., *C. fimbriata coniocraea* (Flk.) Wainio, all collected in Virginia; *Ramalina reticulata* (Noehd.) Krempf., Collected by Mr. C. C. Kingman in Santa Barbara Co., California.
- Mr. C. C. Kingman, 324 North Raymond ave., Pasadena, California. *Porcella rivularis* (Nees) Trev., *Fossombronina longiseta* Aust. Collected in California.
- Mr. D. Lewis Dutton, Brandon, Vermont. *Philonotis fontana* (L.) Brid. cfr., *Dicranella heteromalla* (L.) Sch. var. *sericea* Sch. cfr. Det. Dr. G. N. Best. Collected in Vermont.
- Dr. A. F. K. Krout, Glenolden, Delaware Co., Pa. *Drepanocladus fluitans* (Dill.) Warnst. var. *gracilis* Boul., *Amblystegium fluviatile*, (Sw.) B. & S. Collected in Pennsylvania.
- Mr. Frederick S. Beattie, Tilton, New Hampshire. *Oncophorus Wahlenbergii* Brid. cfr. Collected Franconia Notch, N. H.
- Dr. John W. Bailey, 4541 Fourteenth ave., N. E., Seattle, Wash. *Plagiothecium undulatum* B. & S. Collected in Washington.
- Mr. George L. Kirk Rutland, Vermont. *Tortella tortuosa* (L.) Limpr. cfr., *Porotrichum Alleghaniense* Muell.
- Mrs. Byron C. Leavitt, Millbrook, Mass. *Buxbaumia aphylla* L. Collected in Massachusetts.
- Mr. George B. Kaiser, 524 Locust ave., Germantown, Pa. *Drepanocladus fluitans* (Dill.) Warnst. Collected in New Jersey. *Pleuroidium subulatum* (L.) Rabenh., *Rhodobryum roseum* (Wais.) Limpr., both collected in Pennsylvania.
- Mrs. B. J. Handy, 139 Rock street, Fall River, Mass. *Climacium Americanum* Brid., *Ulota Americana* (Beauv.) Lindb. Collected in Fall River, determined by Dr. Grout, and both in fine fruit.
- Miss M. Edna Cherrington, 96 Gordon ave., Hyde Park, Mass. *Andreaea petrophila* Ehrh., *Hypnum crista-castrensis* L., both cfr. Collected Franconia, N. H.
- Mr. W. W. Calkins, Berwyn, Cook Co. Illinois. *Thelia asprella* Sulliv.
- Mrs. Josephine D. Lowe, 2622 Woodley Place, Washington, D. C. *Hypnum reptile* Mx., *H. splendens* B. & S., *H. imponens* Hedw., *Hylocomium triquetrum* B. & S., *Tetraphis pellucida* Hedw., *Leucobryum glaucum* Schimp., *Philonotis fontana* (L.) Brid. All cfr. Collected in Vermont. Also *Buxbaumia aphylla* L. cfr. for those who especially request it.
- Mr. Harold G. Rugg, Dartmouth College, Hanover, New Hampshire. *Hylocomium proliferum* (L.) Lindb., *Bartramia Oederi* Schwaegr. Both cfr., and collected in Vermont.

FOR SALE.—1st. "The Herbarium of North American Mosses" of the late F. Renauld. This collection of about 650 species and 2900 specimens, includes the types of the species described by Renauld and Cardot. To this will be added an almost complete series of the "Musci maseareno-madagascarienses" (about 250 nos.)

- 2d. "The Herbarium of European Mosses" of the late Prof. L. Piré, about 800 species and 5500 specimens, on which a great part of Rabenhorst's "Bryotheca europaea," Husnot's "Musci galliae," Milde's "Bryologia silesiaca," and H. Muller's, "Westfalens Laubmoose" is based.

For further information, prices, etc. apply to Jules Cardot, 1 Square du Petit Bois, Charlesville, Ardennes, France.

LISTE DES PUBLICATIONS DE M. F. RENAULD.

1^o TRAVAUX PUBLIÉS PAR M. RENAULD SEUL.

1. Aperçu phytostatique sur le département de la Haute-Saône (1873.)
2. Notice sur quelques faits de dispersion des Mousses dans la Haute-Saône. (Rev. Bryol., I, 1874, p. 10-13).
3. Additions à la flore bryologique de la Haute-Saône. (Rev. bryol., I, 1874, p. 36-39; VI, 1879, p. 83-85).
4. Note sur l'Hypnum Vaucheri Lesq. (Rev. bryol., III, 1876, p. 28-29).
5. Note sur le Neckera Menziesii Hook. (Rev. bryol., III, 1876, p. 41-42).
6. Note sur l'Antitrichia californica Sull. (Rev. bryol., III, 1876, p. 56-57).
7. Notice sur quelques Mousses des Pyrénées. (Rev. bryol., IV, 1877, p. 65-68, 81-85; V, 1878, p. 3-7, 22-26, 72-76, 81-84; VI, 1879, p. 26-29, 40-47, 69-73; VII, 1880, p. 2-5, 78-79 103-106; VIII, 1881, p. 32-36; IX, 1882, p. 20-24, 90-94; X, 1883, p. 80-82; XI, 1884, p. 37-41, 52-54; XII, 1885, p. 31-32, 55-58).
8. Recherches sur la distribution géographique des Muscinées dans l'arrondissement de Forcalquier et la chaîne de Lure (Basses Alpes), suivies d'un Catalogue des Muscinées du bassin principal de la Durance. (Extrait des Mémoires de la Société d'Emulation du Doubs), in 8°, 87 p. Besançon, 1877.
9. Une excursion bryologique dans les Pyrénées-Orientales. (Rev. bryol., V, 1878, p. 49-57).
10. Révision de la section Harpidium du genre Hypnum de la flore française. (Extrait des Mémoires de la Société d'Emulation du Doubs) 24 p. Besançon, 1879.
11. Classification systématique de la section Harpidium du genre Hypnum de la flore française. (Rev. bryol., VIII, 1881, p. 73-82).
12. Notice sur la section Limnobium du genre Hypnum. (Rev. bryol., X, 1883, p. 41-52).
13. Les Sphagnum des Pyrénées. (Rev. bryol., X, 1883, p. 97-102).
14. Catalogue raisonné des plantes vasculaires et des Mousses qui croissent spontanément dans la Haute-Saône et parties limitrophes du Doubs. in 8°, 398 p. Besançon, 1883. (1).

15. Notice sur une Fontinale d' Auvergne. (Rev. bryol., XV, 1888, p. 69.)
16. Note sur une collection de Mousses de l'île Maurice. (Rev. bryol., XV, 1888, p. 87-90; XVI, 1889, p. 81-87).
17. Documents nouveaux sur les Muscinées des îles austro-africaines de l'Océan Indien. (Rev. de botanique, IX, 1891, d. 209-229).
18. Notes bryologiques sur les îles Austro-Africaines. (Rev. de botanique, IX, 1891, p. 289-291, 393-401).
19. Influence du terrain sur la distribution des plantes. (Mém. de la Société d'Emulation du Doubs, 1893, p. 202-213).
20. La section Harpidium du genre Hypnum (in Husnot, Muscologia gallica, p. 367-395, pl. CV-CXIII). 1894.
21. Note sur quelques Muscinées rares ou intéressantes constatées dans la Haute-Saône de 1893 à 1895. (Bull. Soc. études sc. nat. de la Haute-Saône, no. 1, Vesoul).
22. Prodrome de la Flore bryologique de Madagascar, des Mascareignes et des Comores, in 4°, VIII et 300 p. Monaco, 1897.
23. Contributions à la flore bryologique de Madagascar. (Act. Soc. Linn. Bordeaux, LIII, 1898, 10 p. et 1 pl.).
24. Notice nécrologique sur Flagey. (Rev. bryol., XXV, 1898, p. 56).
25. Notice sur un Limnobium de l'Amérique du Nord et une forme analogue des Pyrénées. (Rev. bryol., XXVIII, 1901, p. 8).
26. Nouvelle classification des Leucoloma. (Rev. bryol., XXVIII, 1901, p. 66-70, 85-87).
27. Pseudocaliargon a new subgenus of Hypnum. (Bryologist, IV, 1901, p. 63-67, pl. VII et VIII).
28. Causerie sur les Harpidia. (Rev. bryol., XXXIII, 1906, p. 89-100; XXXIV, 1907, p. 7-14).
29. Notes sur quelques Drepanocladus. (Rev. bryol., XXXVI, 1909, p. 129-138; XXXVII, 1910, p. 29-34).
30. Essai sur les Leucoloma.
31. Prodrome de la Flore bryologique de Madagascar, des Mascareignes et des Comores. Supplément (in-4to, X, 50 et 139 p. avec XXIV pl. Monaco, 1909).
32. De la notion de l'espèce au point de vue de la nomenclature (Journal de Botanique de Morot, XXII, no. 6, juin 1909, pp. 135-146).

2° TRAVAUX PUBLIÉS PAR M. RENAULD EN COLLABORATION.

33. Guide du bryologique dans la chaîne des Pyrénées et le Sud-Ouest de la France. Ire partie. Bassin sous-pyrénéen. (Rev. de bot. II, 1884, 40 p.). IIe partie. Pyrénées. Exploration. Département des Hautes Pyrénées. (Rev. de bot. III, 1885, 34 p.). IIIe partie. Bryogéographie des Pyrénées. (Mém. Soc. Nat. Sc. nat. et math. Cherbourg, XXV, 1889, 194 p.). En collaboration avec M. le Dr. Jeanbernat.
34. Notice sur quelques Mousses de l'Amérique du Nord. (Rev. bryol., XII, 1885, p. 11-12, 44-47; XV, 1888, p. 69-72; XVI, 1889, p. 10-11). En collaboration avec M. J. Cardot.

35. Enumération des Muscinées récoltées par le Dr. Delamare à l'île Miquelon (Amérique septentrionale). (Rev. bryol., XIV, 1887, p. 4-6). En collaboration avec M. J. Cardot.
36. La fructification de l'*Ulota phyllantha* Brid. (Rev. bryol., XV, 1888, p. 36-37). En collaboration avec M. J. Cardot.
37. Florule de l'île Miquelon (Amérique du Nord). Enumération systématique avec notes descriptives des Phanérogames, Cryptogames vasculaires, Mousses, Sphaignes, Hépatiques et Lichens, in-8to, 79 p. Lyon, 1888. En collaboration avec M. E. Delamare et J. Cardot.
38. New Mosses of North America. (Bot. Gaz. XIII, 1888, p. 197-203, pl. XIII-XX; XIV, 1889, p. 91-100, pl., XII-XIV; XV 1880, p. 39-45, pl. V-VII; p. 57-62, pl. VIII et IX; XIX, 1894, p. 237-240, pl. XXI et XXII; 1896, p. 48-53, pl. III-V). En collaboration avec M. J. Cardot.
39. Mousses nouvelles de l'Amérique du Nord. (Bull. Soc. bot. de Belg. XXVII, part. I, (1888), p. 127-137, pl. III-X; XXVIII, part. I, 1889, p. 121-134, pl. VII-IX; XXIX, part. I, 1890, p. 145-160, pl. II-VI; XXXV, part. I, 1896, p. 119-125, pl. I et II; XXXVI, part. II, 1897, p. 175-180, pl. X-XII). En collaboration avec M. J. Cardot.
40. Musci exotici novi vel minus cogniti. (Bull. Soc. bot. de Belg. XXIX, part. I, 1890, p. 161-186; XXX, part. II, 1891, p. 181-207; XXXI, part. II, 1892, p. 100-123; XXXII, part. II, 1893, p. 8-40; XXXII, part. I, 1893 p. 101-121; XXXIII. part. II? 1894, p. 109-137; XXXIV? part. II, 1895, p. 57-78; XXXV, part. I, 1896, p. 299-325; XXXVIII, part I, 1899, p. 7-48; XLI, part. I, 1902-1903, p. 7-122). En collaboration avec M. J. Cardot, et avec M. Stephani pour les Hépatiques.
41. Contributions à la flore des Muscinées des îles Austro-Africaines de l'Océan Indien. I Hépatiques. (Rev. bryol., XVIII, 1891, p. 55-60). En collaboration avec M. J. Cardot et M. Stephani.
42. Musci costaricensis. (Bull. Soc. bot. de Belg XXXI, part. I, 1892, p. 145-173; XXXII, part. I. 1893, p. 174-201; XLI, part. I, 1902-1903, p. 123-148). En collaboration avec M. J. Cardot.
43. Enumeration of the Kansas Mosses. (Bot. Gaz. XVII, 1892, p. 81-85. En collaboration avec M. J. Cardot.
44. Musci Americae septentrionalis, ex operibus novissimis recensiti et methodice dispositi. (Rev. bryol., XIX, 1892, p. 65-96; XX, 1893, p. 1-32). En collaboration avec M. J. Cardot.
45. Pleurocarpae, in Röhl, Nordamerikanische Laubmoose, Torfmoose und Lebermoose. (Hedwigia, 1893, Hft. IV, p. 241-279). En collaboration avec M. J. Cardot.
46. Musci Americae septentrionalis exsiccati. Observations et rectifications sur les espèces distribuées in 8°, 18 p. autographiées. Stenay, 1894. En collaboration avec M. J. Cardot.
47. Mousses nouvelles de l'herbier Boissier. (Bull. Herb. Boissier, II, 1894 p 32-33; III, 1895, p. 240-241). En collaboration avec M. J. Cardot.
48. Diaphanodon Ren. et Card. gen. nov. (Rev. bryol., XXII, 1895, p. 33-34). En collaboration avec M. J. Cardot.

49. Musci Americae septentrionalis exsiccati. Notes sur quelques espèces distribuées dans cette collection. (Bull. Herb. Boissier, IV, 1896, p. 1-19). En collaboration avec M. J. Cardot.
50. Ergänzende Bemerkungen über die von Herrn Dr. Julius Röhl in Nord Amerika im Jahre 1888 gesammelten pleurocarpen Moose. (Hedwigia, XXXV, 1896, p. 306-311). En collaboration avec M. J. Cardot.
51. Mousses récoltées à Java par M. J. Massart. (Rev. bryol., XXIII, 1896, p. 97-108). En collaboration avec M. J. Cardot.
52. Mousses de Madagascar, in : Grandidier, Histoire physique, naturelle et politique de Madagascar, Atlas. 163 pl. 1898-1905. En collaboration avec M. J. Cardot, mais les 130 premières planches sont l'oeuvre exclusive de M. Renauld. L'explication des 163 planches actuellement publiées se trouve à la fin du Supplément au Prodrôme de la Flore bryologique de Madagascar, des Mascareignes et des Comores (voir no. 31).
53. Matériaux pour la flore du Congo. Muscineae. (Bull. Soc. bot. de Belg. XXXVIII, part. II, 1899, p. 72-74). En collaboration avec M. J. Cardot.
54. Rhacopilopsis Ren. & Card. nov. gen. (Rev. bryol., XXVII, p. 47). En collaboration avec M. J. Cardot.
55. Matériaux pour la flore du Congo. Musci. (Bull. Soc. bot. de Belg. XXXIX, part. II, 1900, p. 106-112). En collaboration avec M. J. Cardot.
56. Note sur le genre Taxithelium R. Spr. (Rev. bryol., XXVIII, 1901, p. 109-112). En collaboration avec M. J. Cardot.
57. Mousses des Canaries, récoltées par M. A. Tullgren, et Coup d'oeil sur la flore bryologique des îles atlantiques. (Bull. Herb. Boissier, 2^e sér., II, p. 433-453, pl. VI et VII). En collaboration avec M. J. Cardot.

EXSICCATA.

1. Musci marcarenomadagascarienses, 250 nos.
 2. Musci Americae septentrionalis exsiccati, 400 nos.
 3. Musci europaei exsiccati, 300 nos.
- Les deux derniers en collaboration avec M. J. Cardot.
From the "Revue Bryologique" 37: pp. 110-114, 1910.

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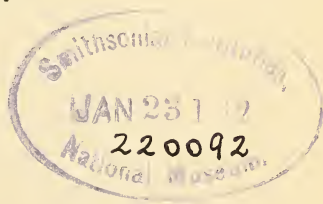
NORTH AMERICAN MOSSES

HEPATICS AND LICHENS

VOLUME XIV

COMPILED BY

ANNIE MORRILL SMITH



NEW DORP, N. Y.
1911

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Winslow, E. J.....	5, 6

ERRATA

Page 1, line 12, for *sordium*, read *sordidum*.

Page 1, line 10 from bottom, for *Rothii*, read *Rothii*.

Page 5, line 2 from bottom, for *spagnum*, read *sphagnum*.

Page 5, line 4 from bottom, for *sphagnum*, read *sphagnum*.

Page 13, line 15, for *SKRIFLERI*, read *SKRIFTER*.

Page 16, the name of the Treasurer, Mrs. A. M. Smith, should follow the report.

Page 16, line 18 from bottom, for *Fosombronia*, read *Fossombronia*.

Page 26, line 28, for *Mulleri*, read *Muelleri*.

Page 34, line 8, for *California*, read *Californica*.

Page 34, line 16, for *Cephaloziella divaricata scabra* (M. A. Howe), read *Cephaloziella divaricata scabra* M. A. Howe.

Page 39, title for Sarekgebirges, read Sarekgebietes, and in second line of same article for Sarekgebirges, read Sarekgebirge.

Page 41, title and cover for May for *Cryologica*, read *Bryologica*.

Page 43, line 26, for *cavillaris*, read *capillaris*.

Page 53, line 5, for *POLYCARDA*, read *POLYCARPA*.

Page 53, line 8 from bottom, for *MUHLENBERGII*, read *MÜHLENBERGII*.

Page 53, line 9 from bottom, for *horum*, read *hornum*.

Page 53, line 13, from bottom, for *MUHLENBECKII*, read *MÜHLENBECKII*.



JANUARY 1911



THE BRYOLOGIST

AN ILLUSTRATED BIMONTHLY DEVOTED TO
NORTH AMERICAN MOSSES
HEPATICS AND LICHENS

FOUNDED IN 1898
By
ABEL JOEL GROUT, Ph.D.

EDITOR
ANNIE MORRILL SMITH

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PLATE. I. Lichen covered rocks in Kaaterskill Clove, Catskill Mountains.

THE BRYOLOGIST

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NO. 1

MOSS AND LICHEN COLLECTING IN THE CATSKILLS.

GEORGE B. KAISER.

Most interesting from a cryptogamic view-point is that section of the Catskill Mountains which surrounds Haines Falls, New York, where a month has been spent in each of the summers of 1908, 1909 and 1910.

On rocks in the Kaaterskill Clove *Ulotia Americana* may be found in excellent fruiting condition in July with *Hedwigia albicans*, *Dicranum fulvum*, *Grimmia apocarpa*, *Hypnum reptile*, the lichen *Parmelia*—several species—and many crustose forms of the *Lecideaceae*. On tree trunks *Ulotia crispa* is to be seen everywhere with less frequently the species *Ludwigii*. *Drummondia clavellata* is also common on this substratum with *Orthotrichum speciosum*, *O. sordium* and *O. strangulatum*, *Leucodon julaceus* and *L. sciuroides* and the lichen *Ramalina calicaris fastigiata*.

In Mary's Glen—a Mecca for the bryologist—one walks over a rich carpet of mossy greenery. *Bazzania trilobata* appears in deep dark cushions with interspersed masses of *Dicranum scoparium* and *Leucobryum glaucum*. On every log *Ptilidium pulcherrimum* grows luxuriantly with graceful *Thuidiums* and *Hypnums*—that incomparable species *H. crista castrensis* now and then occurring though not at its best, as it may be seen on Hunter Mountain. Here *Neckera pennata* abundantly fruiting grows out from the tree trunks in graceful curves and after a rain the lichen *Sticta pulmonaria* with its emerald stag-horn branching, is most conspicuous. In boggy places *Dicranum undulatum* forms broad silken patches with *Hypnum Schreberi*, and the less frequent *Dicranum Drummondii*, while the rocky bed of a stream is beautified with *Brachythecium rivulare*, *Mnium punctatum elatum*, *Fontinalis* and *Scapania*.

Near Sleepy Hollow, where Rip Van Winkle is said to have taken his long nap, you may find wet ledges where *Bryum bimum* is mature in July, and in the deep surrounding woods grow those showy mosses *Hylocomium proliferum*, *H. triquetrum* and rarely *H. brevisostre*. The exposed rocks are rich in lichens belonging to such genera as *Gyrophora*, *Umbilicaria* and *Collema*, and *Racomitrium microcarpum* with *Andreaea Rothii* may also be found.

On High Peak, *Fontinalis gigantea*, *Frullania Asagrayana* and *Dicranum fuscescens* are not infrequent, and lichens—several species of *Cladonia*, *Usnea barbata* and *Bryopogon jubata* abound. In all this section the *Peltigeras* are common over mosses, rocks and soil, beginning to fruit in July. The bright green thallus of *P. aphthosa* is particularly beautiful. *Sticta amplissima* and *Leptogium tremelloides* occur more rarely. The moss *Oncophorus Wahlenbergii* was found fruiting in the

Plaaterkill Clove. In fact in all directions this region is rich in mosses, hepatics and lichens, and the enthusiastic botanist may for weeks revel in a succession of profitable trips afield. Germantown, Pa.

ADDITIONS TO THE LICHEN-FLORA OF SOUTHERN CALIFORNIA. No. 5.

H. E. HASSE.

Caloplaca erythrella (Ach.) var. **rubescens** (Ach.) comb. nov. *Lecanora erythrella* Ach. var. *rubescens* Ach. in Ach. Li. Un. 402, 1810. *Lecanora aurantiaca* Lightf. var. *rubescens* Schaer. in Leight, Li. Fl. Gr. Bri. 3d ed. 207, 1879.

Subsp. *Lecanora erythrella* Nyl. f. *rubescens* Nyl. in Crombie Br. Li. 347. 1894.

Thallus light clay colored, effuse, almost disappearing, with KHO crimson. Forming small patches almost covered by the crowded apothecia, these are sessile, small, 0.25 to 0.5 mm. in diameter, congregated into 3 to 4 mm. wide groups; disk is orange, mostly flat with a whitish, thin, thalline margin, with KHO purple. Epithecium subcontinuous, yellow; thecium colorless, 56μ to 60μ high; paraphyses loosely coherent; hypothecium colorless; asci inflated clavate; spores in 8-s, ellipsoid and oblong-ellipsoid, polari-bilocular, an isthmus absent or in some spores faintly discernable, 16μ to 23μ long, 8μ to 9.5μ thick. Hym. Gel. with Iod. blue, with KHO crimson.

On argillaceous rocks near the Soldiers Home, collected in 1900.

LECANORA THAMNOPLACA Tuck in Tuck. Syn. I. 183. 1882.

Thallus thick, pale buff squamules, imbricated, entire or lobulated at the circumference toward the center more erect, flattening at the top and somewhat subfruticulose; both the upper and lower surface corticated; apothecia numerous, innate, from 0.5 to 2 mm. wide, disk flat to lightly convex, dark brown, smooth to papillate; epithecium continuous, red-brown; thecium colorless, 80μ to 88μ high; paraphyses coherent, stout, septate; hypothecium colorless; asci inflated clavate, 8-spored; spores ovoid 8μ to 11μ long, 7μ to 8μ thick. Hym. Gel. with Iod. indigo blue, soon changing to sordid grayish-brown; spermogones not seen.

On granitic and igneous rocks near Little Lake, Inyo County at 1350 meters elevation. Collected in April, 1910.

Placynthium nigrum (Huds.) S. Gray subsp. **P. psotinum** (Cromb.) comb. nov.

Pannaria psotina (Ach.) in Leight Li. Fl. Gr. Bri., 3d ed. 156. 1879.

Pannaria nigra Nyl. Subsp. *psotina* Cromb. in Cromb. Br. Li. 343. 1894.

Thallus coralloid crustaceous, similar in color and form to the type, though less robust and the apothecia also smaller 0.4 to 0.5 mm. in width. The spores are ovoid, 13μ to 15μ long, 7μ to 8μ thick, three and four-locular, the loculi often slightly irregular in size and form.

On calcareous rock, North Fork of the Matilija Cañon, Ventura County. Collected in April, 1903.

***Biatorella terrena*, n. sp.**

Thallus crustaceous, of small, flat, contiguous and imbricate squamules, the largest lobulated, not exceeding 1 mm. in width, mostly smaller, round and entire, of a sombre olive-green color: hypothallus indistinct. Apothecia sessile, 0.5 to 1 mm. in diameter, disk persistently flat, brown-black, thalline margin entire, slightly elevated. Epithecium continuous, red-brown, gradually paling downward; thecium 76μ to 96μ high, colorless or here and there with tinges of brown extending downward from the epithecium; paraphyses slender, compact coherent, not septate, a few forked below the tips: hypothecium sordid pallid-brownish, subtended by a thin gonidial layer; asci saccate or subventricose, the membrane thickened above; spores numerous, minute, oblong, 3μ to 3.5μ long, 1μ thick. Hym. Gel. with Iod. handsome blue, the epithecium not changing color.

On earth between stones, and at base of rocks. Type locality at "Squirrel Inn," North Fork of the San Gabriel Cañon, Los Angeles County, at 1300 m. alt., July, 1901. Type deposited in herb. Hasse.

The following species, not collected in the state, may yet be found in its south-eastern part:

***Acarospora peltata* n. sp.**

Thallus of scattered or contiguous squamules, dirty cream color to whitish, broadly peltately affixed, 1.5 to 3.5 mm. wide, undulate and lobate in outline, the smaller entire, the upper surface pulverulent, KHO—Ca (Cl. O) 2—, radiately or irregularly fissured. Apothecia solitary, rarer several in a squamule, immersed-urceolate, small, at last superficial and enlarging to 0.6 mm. in diameter, disk brown-black, naked or pruinose, the thalline margin thin, fissured, when moistened becoming turgid and elevated above the thalline surface; upper and free lower surface of thallus pseudo-membraneous corticate, composed of small cells. Epithecium subcontinuous, grayish-yellowish or light yellowish-brown; thecium colorless, 140μ to 180μ high; paraphyses coherent and adglutinated at the tips, not thickened nor colored; hypothecium pallid; asci subventricose and saccate, 128μ to 140μ long, 28μ to 30μ thick, the upper part of membrane thickened. The numerous, oblong and oblong-ellipsoid, colorless, simple spores, 6μ to 10μ long, 2.5μ to 3μ thick. Hym. Gel. with Iod. blue soon turning sordid greenish-brownish, the hypothecium retaining the blue stain longer than the other structures.

On sandstone. The type locality near Adamana, Arizona. June, 1904. Type in herb. Hasse.

***Caloplaca verrucosa* n. sp.**

Thallus graphite colored; forming small patches of loosely aggregated, uniform verrucae, the surface delicately rimose, no reaction with KHO or with Ca (Cl. O) 2.; hypothallus black, indistinct. Apothecia sessile, disk blackish, flat with a subturgid thalline margin; epithecium subcontinuous, blue-gray; thecium 64μ to 68μ high, colorless; paraphyses medium stout, thickened and septate above, with a globular faintly colored head; hypothecium pale resting upon a gonidial layer; asci oblong, 8-spored; spores simple

and polari-ocular, 12μ to 19μ long, 6μ to 9μ thick, oblong-ellipsoid, the loculi approximate, the smaller spores simple and the endospore slightly constricted indicating the future septation, or these are distantly polari-ocular with or without a connecting tube, epithecium and cortex of thallus stained violet with KHO.

On sandstone. Type locality near Adamana, Arizona. June, 1904.
Type in herb. Hasse. Sawtelle, California.

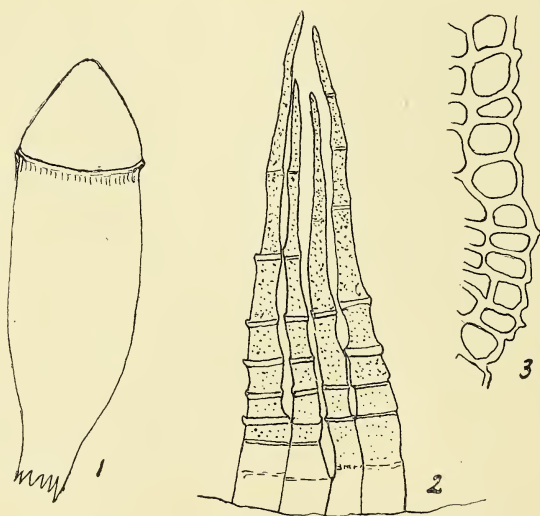


PLATE II. *Trichodon borealis* n. sp.

- Fig. 1. Moistened capsule $\times 50$.
Fig. 2. Section of peristome $\times 270$.
Fig. 3. Section of base of lid $\times 270$.

Drawn by R. S. WILLIAMS

TRICHODON BOREALIS, N. SP.

R. S. WILLIAMS.

Dioicous, male plants 3 to 5 mm. high, bearing 1 to 3 brownish buds, growing in readily separating green tufts with mostly simple stems radiculose at base and up to 5 mm. high; stem leaves gradually larger upward, the upper about 2.5 mm. long, from an ovate, clasping base rather gradually narrowed to a spreading-flexuous, subulate, grooved point more or less rough on the back, the narrow leaf blade usually extending nearly to apex with borders flat and obtusely denticulate or crenate often to the enlarged base of leaf; costa percurrent or slightly excurrent, often faint at base, up to 40μ wide; leaf cells irregularly rectangular, the median about 6μ wide and 8 to 12μ long; inner perichaetial leaves about like upper stem leaves but with broader, more clasping base more abruptly narrowed to a spreading, rough point; seta brownish, flexuous, 5 to 7 mm. long; capsule oblong, nodding, not quite straight, about 1 mm. long without lid, the median exothecal cells about 16μ wide and up to twice longer; stomata few, in one row at base; annulus 40μ wide, of 3 rows of cells; peristome teeth reddish brown, finely papillose, at base only nearly smooth, divided into 2 forks to a little above the rim of capsule, the articulations distinct, 8 or 9 in number, somewhat close together below, gradually more distant upward; lid conical, its height not much exceeding its basal diameter, with border sinuous or somewhat notched; spores smooth, up to 12μ in diameter; calyptra about 1.25 mm. long, smooth at apex, the base not quite entire.

Collected near Dawson, Yukon Territory, July 9, 1899.

This moss was found, nearly concealed among various other species, on damp earth in a small ravine just back of Dawson. I obtained but a very small amount although spending some time in searching for more specimens. It differs at once from *Trichodon cylindricus* by its capsule only one-half as long in proportion to its width, by its much shorter lid and by the perichaetial leaves more entire. The plant seems to be much nearer *Trichodon oblongus* Lindb. found in Spitzbergen and Norway of which I have been unable to see specimens, but this latter species is described and figured by Roth in his Europ. Laubm. 1: 270. 1903, where the lid is shown to be relatively about twice higher than in the Yukon species, the peristome teeth have 4 or 5 articulations close to their base and they are described as being pale and nearly smooth, also the annulus is said to consist of 1 or 2 rows of cells and the spores to be 14 to 16μ in diameter. New York Botanical Garden.

PALUDELLA SQUARROSA IN VERMONT.

E. J. WINSLOW.

While collecting in a sphagnum bog in Brownington, Vermont, last July I came upon a moss of striking and unfamiliar appearance. Tho the moss seemed fairly abundant, it grew so mixed with the spagnum and other mosses that I collected only a small amount.

Recently upon opening my mosses for examination this moss proves to be *Paludella squarrosa* (L.) Brid. of which I am unable to find any previous record for New England. I shall certainly get a larger quantity on my next visit.

Specimens have been submitted to Mr. Chamberlain who verifies the determination, and to Mr. Collins who sends the following record of its collection:

"I find I have no record of any station for *Paludella* in New England. The record that I had in mind proves to be a New York record. Other records are Greenland, Hudson's Bay, Mt. Albert and Grand River (Gaspé), Anticosta, Rocky Mts. of Canada, British Columbia, Saskatchewan, Alaska, and near Montreal, Canada." Auburndale, Mass.

"THE LICHEN FLORA OF THE SANTA CRUZ PENINSULA." A REVIEW.

LINCOLN WARE RIDDLE.

The appearance, within a period of less than a month, of two extensive and important papers on lichens is a sufficiently remarkable experience in North American Lichenology to call for special notice. Prof. Bruce Fink's "Lichens of Minnesota," which appeared June 1, 1910, has already been reviewed in these pages.¹ And it now becomes the reviewer's privilege to call to the attention of the readers of THE BRYOLOGIST the work of Dr. A. C. Herre on "The Lichen Flora of the Santa Cruz Peninsula, California," published May 15, 1910.² It is of interest to compare these two papers in a general way. Each represents the intensive study of a restricted region; each author has published various preliminary studies,³ and in each case the present papers come as the culmination of prolonged work. Minnesota being the larger field offers 439 species and varieties, but the richness of the Californian flora results in the description of 309 species and varieties from the smaller area.

Dr. Herre's paper should be of special interest to American students as being the first important paper to embody consistently Dr. Zahlbruckner's ideas of classification and nomenclature as presented in his treatment of the lichens in Engler and Prantl.⁴ After the long established authority of Tuckerman's "Synopsis of the North American Lichens" to which we are accustomed this can not but seem radical. Yet it is undoubtedly the nearest approach that we yet have to a classification upon which the majority of

1. BRYOLOGIST 13: Nov. 1910.

2. Herre, A. W. C. T. The Lichen Flora of the Santa Cruz Peninsula, California. Proc. Washington Acad. Sci. 12: 27-269. 1910.

3. Herre, A. W. C. T. The Folioseous and Fruticose Lichens of the Santa Cruz Peninsula, California. Proc. Wash. Acad. Sci. 7: 325-396. 1906. Lichen Distribution in the Santa Cruz Peninsula, California. Botanical Gazette 43: 257-273. 1907.

4. Engler and Prantl Die Natürlichen Pflanzenfamilien. Teil I. Abteilung No. 1.

lichenologists can in general agree. It is, therefore, of value to have the system applied concretely to the lichen flora in an American locality.

A subsequent paper⁵ by Dr. Herre points out the peculiarities of the California lichen flora, with which the earlier publications of Dr. H. E. Hasse have already made us somewhat acquainted. Yet with due allowance for these peculiarities, it is doubtful if Dr. Herre has not been somewhat too free in his proposal of new species, the present paper and those preliminary to it including 14 new species, named by Dr. Herre himself, with 3 more named by Dr. Zahlbruckner. It seems probable that some of these will share the fate which has already overtaken the *Gyrophora diabolica* Zahlbr. of the earlier paper⁶ (1906), which proved to be *G. polyrrhiza* (L.) Koebr., well-known in Europe, but new to this country. Another case noticed in reviewing the paper is that of *Parmelia olivacea* var. *polyspora* Herre (p. 199) which is evidently *P. multispora* Schneider,⁷ discussed at different times in THE BRYOLOGIST by Mr. G. K. Merrill⁸ and Dr. H. E. Hasse,⁹ who point out the wide distribution of the plant along the Pacific Coast. One new genus, *Zahlbrucknera*, with the species, *calcareia*, is also described.

The paper is furnished with keys, a procedure in lichen publications which can not be too strongly encouraged. The generic keys are based on those in Engler and Prantl (l. c.). The value of the specific keys, based on Dr. Herre's own work, can be judged only after extended trial. In the key to *Ramalina* (p. 215, bottom of page), there is evidently a mistake in arrangement, which is especially to be regretted as it involves *R. Menziesii* Tuck. upon the diagnostic characters of which eastern lichenologists would be glad of more light. In the key to *Pertusaria* (p. 165), there is introduced a new diagnostic character for *P. amara* (Ach.) Nyl. First we had the morphological study of lichens, then we had to apply chemical tests, and now, it appears, that we must taste our lichens! for *P. amara* is said to be "bitter to the taste, like quinine." This may be an excellent character, but would it not be rather inconvenient to use in the examination of a large series of specimens?

In addition to the assistance rendered by the keys, each species is accompanied by synonymy sufficient to place it, together with a description concise enough to be almost of diagnostic value.

To the descriptions Dr. Herre has added the chemical tests, which we are glad to have, apart from any opinions as to their value.

In spite of some points open to criticism, Dr. Herre has produced a valuable and stimulating work, and deserves the gratitude of lichenologists in contributing to the knowledge of one of the most interesting parts of our country.

Wellesley College, Wellesley, Mass.

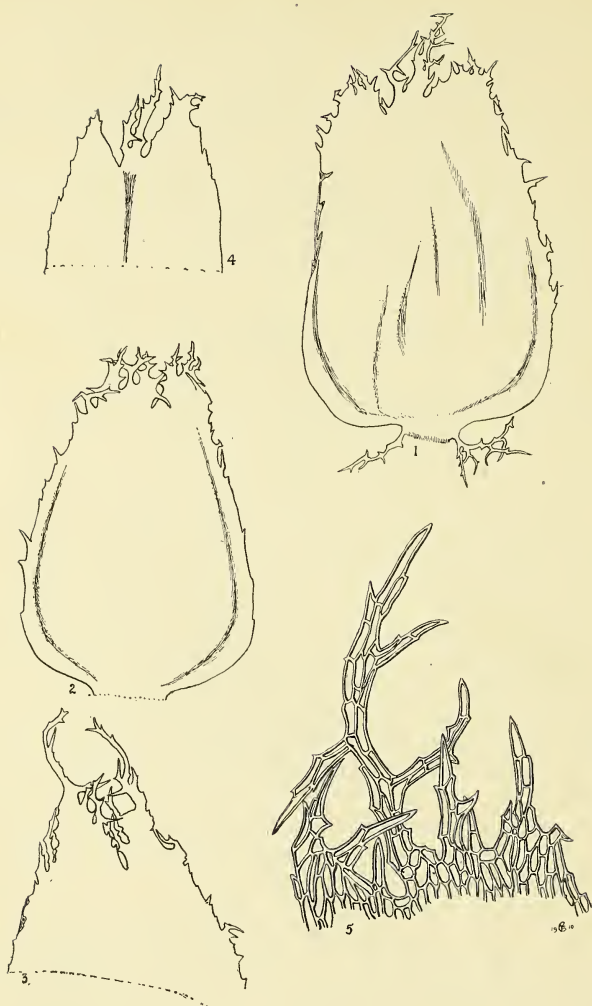
5. Herre, A. W. C. T. Suggestions as to the Origin of California's Lichen Flora. Plant World 13: 215-220. Sept. 1910.

6. Proc. Wash. Acad. Sci. 7: 366. 1906.

7. Schneider, A. Guide to the Study of Lichens, p. 154. 1898.

8. BRYOLOGIST 12: 73. 1909.

9. BRYOLOGIST 13: 60. 1910.



EXPLANATION OF PLATE III. *Hylocomium Pyrenaicum* SPRUCE.

Figs. 1-2. Leaves from the middle of a growing stem. Figs. 3-4. Apical portions of leaves. Fig. 5. Portion of the apex of a leaf, showing the structure of the processes. Figures 1-4 are $\times 25$; figure 5 $\times 125$.

A PECULIAR HYLOCOMIUM.

EDWARD B. CHAMBERLAIN.

Some three years ago a specimen of a most peculiar *Hylocomium* was received from the Rev. H. Dupret of Montreal, accompanied by a note stating that the plants were apparently some form of *Hylocomium Pyrenaicum* Spruce, but that the structure of the leaves was unlike anything described for this species. The plants were collected by Mr. Jos. Bedard at Nominique, Quebec, in August, 1907, scattered through tufts of *Dicrana*

The plants are evidently depauperate, having slender stems with few branches, which are often much attenuated at the tip. In the red stems densely covered with large branched paraphyllia and the basal areolation of the glossy leaves, the plant agrees well with *Hylocomium Pyrenaicum*. The leaves themselves are oblong ovate, smooth, somewhat plicate and revolute below, with only faint traces of a nerve in most cases. The margin becomes more and more strongly dentate toward the upper part, where, instead of the usual acumination, a fringe of lacinate dentate processes gives the leaves a peculiarly blunt appearance. Moreover, the leaves are often split above into two or three lobes which are again fringed in the most diverse manner. If there be three lobes, the central one is usually narrower with thick-walled cells. The processes themselves are composed of two or three rows of linear cells and are much branched and dentate. The areolation at the base of the leaves is normal, but becomes very irregular above, there being at times almost a false nerve of thick-walled cells.

It will be noticed at once that these peculiar processes are practically identical in structure with the paraphyllia which cover the stem and are often attached to the base of the leaves, but this similarity does not seem to furnish any explanation for the peculiar development. Indeed, the writer is wholly at loss in this regard. That many species of mosses reproduce vegetatively from the protonemata produced by detached portions of the stem or leaves, has long been known, and the leaves of the younger portions of the plants here described show a greater development of the peculiar processes. Still even the oldest leaves show traces of it, though with a certain ragged appearance as if the filaments had decayed or broken off. Perhaps the processes break off as the leaves grow older and broken portions develop new growths. Yet the very slight resemblance in structure and cell contents between the processes and ordinary protonemal filaments, as well as the absence of any trace of a cleavage line, seems opposed to this explanation. Moreover, no reference is made by Correns in his work. "Vermehrung der Laubmoose," to any such cases in the genus *Hylocomium*, nor has the writer been able to discover any references in other literature to the peculiar structures here described.

New York City.

“MOSESSES WITH HAND-LENS AND MICROSCOPE.” A REVIEW.

GEORGE N. BEST.

A noticeable feature of this valuable work is its wealth of illustrations. It contains no fewer than 88 full-page plates and 265 figures. The larger part of these plates have been taken from either Sullivant's *Icones Muscorum* or the *Bryologia Europea*, and are in every respect equal to the originals, which is equivalent to saying that none better have as yet been produced. While not so highly artistic, the figures, scattered through the 416 pages of text where most needed, answer quite well the purpose for which they were intended, and considerably enhance the value of the work. The mechanical execution of this book is all that could be desired—heavy paper, wide margin, clear type, and neat and substantial binding.

In the preparation of *Mosses with Hand-Lens and Microscope*, covering a period of about eight years,¹ the author has exercised a commendable eclecticism in gleaning from various sources, more especially from the current literature of the subject, such material as seemed best suited to his purpose, and by this means has been enabled to keep his own work well up with the latest advances in bryology. In matters pertaining to nomenclature extremes have been avoided, and a conservative but by no means antiquated course has been pursued. The claim that this work is “non-technical” would scarcely be allowed without qualification. No doubt the author intended it to be as free from technicalities as it could possibly be made without compromising it in other respects. But every science, and trade as well, must of necessity have a language of its own, a language which the novice must acquire if he expects to master the science or the trade.

While it is freely conceded that Dr. Grout's book contains a great deal that is of inestimable value to the professional bryologist, its strongest appeal is to the student and the amateur. In fact, it is with feelings akin to envy, possibly mixed with regret, that we recall our own hard struggles and bitter disappointments as we tried to force our way, some fifteen years ago, through the labyrinthian maze of genera and species of the Musci with the aid of Lesquereux and James' Manual and Barnes' Keys. In comparison our state of mind would have been Utopian if we had had at our command a work like this, containing chapters on such practical subjects as “The Collection and Preservation of Mosses,” “How to Mount Mosses,” “Methods of Manipulation,” “Life History and Structure of the Moss Plant,” “Illustrated Glossary of Bryological Terms,”—so easy and so plain as to make mistakes almost impossible, and a manual each step of which is safeguarded by a description that describes, an illustration that illustrates, or a friendly caution that prevents our making the same blunder as perchance the author himself once did, much to his discomfort.

On the whole, in Dr. Grout's book we find but little to censure, a great deal to commend. In the manual part a larger number of species might have

1. Part I. appeared June, 1903. and Part V.. completing the work, July, 1910.

been described, but we question whether it would have been the better for it, possibly not so good. This work is to be regarded rather as an adjunct to a systematic treatise than of a complete or systematic treatise in itself. The author is a teacher, and as such appeals to methods. In Mosses with Hand-Lens and Microscope, *how* to study mosses to the best advantage is the object to be attained; and properly so, for usually after we learn "how," the results promptly follow. Considerable pains has been taken to blaze the way for an understanding of such difficult genera as *Orthotrichum*, *Bryum* and *Amblystegium*. The treatment of these must be considered a model of perspicuity. We welcome this work as being by far the best contribution yet made to American bryology.

G. N. BEST.

REVIEWS OF CURRENT LITERATURE.

The Mosses collected by the last French *Antarctic Expedition*, under the direction of Dr. Jean M. Charcot, extending from 1903 to 1905, have been elaborated by M. Jules Cardot, and are published under the auspices of the Minister of Public Instruction of France. In point of number of species this collection is not very important, only 18 species being reported by M. Cardot. One new species, *Brachythecium Turqueti*, is illustrated. But, while the number of species is small, the light thrown by these collections made under such trying climatic conditions, upon the struggle of organisms through the antarctic cold is interesting. M. Cardot, through whose hands have passed all the bryological antarctic collections of recent years, in this report sums up the present status of our knowledge, showing that only 51 species of mosses are known from the Antarctic Regions, 24, or nearly half of which, are endemic. But of these, M. Cardot shows, several species are in truth polar representatives of species belonging outside the antarctic zone. And here he mentions *Dicranum Nordenskiöldii* Card., as modified from *D. aciphyllum* Hook. f. et Wils.; *Polytrichum antarcticum* Card., from *P. piliferum* Schreb., and *Brachythecium antarcticum* Card., certain forms of which he points out approach closely to *B. georgico-glareosum* (C.M.) Paris. And possibly also *Bryum amblyolepis* Card. belongs here, since it may be considered a race, or subspecies of *B. argenteum* L. Yet all these plants, the author points out, show characters sufficiently important to entitle them to rank as distinct species.

JOHN M. HOLZINGER.

P. S. The public press of Feb. 12, 1910, reports from Valparaiso, Chili, of the French Antarctic Expedition as again in the field under Charcot, that it has "reached lat. 70° S., long. 126° W., and discovered 120 miles of new land to the west and south of Alexander Island."

Mr. Cardot has also completed his report on the Mosses collected on the National Antarctic Expedition in the steamer *Discovery*. At the five stations established by the *Discovery*, seven species of mosses were collected, two of which are new: *Didymodon gelidus* Card., and *Bryum atgens* Card. These are described and figured in two plates. In the Bulletin de l'Herbier Boissier, of 1908, No. 2, M. Cardot describes a new dicranaceous genus,

Campylopodiella, with one species, *C. tenella* Card., based on plants from Sikkim, Darjeeling, India, communicated by Dr. Levier, of Florence, Italy. The description is accompanied by a page of illustrations.

In the same publication, M. Cardot has an article on the genus *Leucobryum* in Japan, reducing the 12 species described from these islands to four, namely *Leucobryum scabrum*, *glaucum*, *Bowringii* and *neilgherrense*. Under this last species are according to the writer included *L. Torrici*, *lacteolum*, *brevicaule*, *galeatum*, *Japonicum*, *Wichuræ* and *retractum*.

In a third article of this publication M. Cardot reports on a small collection of Mosses from New Caledonia made by Deplanche and Vicillard, which the writer found had not been taken account of in Bescherelle's Florule, nor in the more recent publications of Brotherus and Thériot. This collection included 26 species, four of which are new; *Dicranum perlongifolium*, *Macromitrium gracilipes*, *M. rufipilum* and *Trichosteleum vicillardi*. These are both figured and described.

In a fourth brief article M. Cardot reinstates, describes and figures *Dicranum Novæ-Hollandiæ* Hsch., which C. Müller, in consequence of a confusion of specimens, had reduced to a synonym of *Hypnum aureum* Lam.

JOHN M. HOLZINGER.

Contributions to the Moss Flora of Norway. No. IV. by N. BRYHN.

This is an extract from "Nyt. Mag. for Naturoid." B. 45, H. H. Kristiania, 1907, comprising pp. 113 to 130 incl. It enumerates 32 species of Hepaticæ, and 121 species of Musci, including four of Sphagna. In a brief, charming introduction the author points out that Gunner knew only 70 species of mosses, and said that he believed that hardly a plant could be found in Norway which he had not seen.

"In the century after the time of Gunner the noted moss students, Hartman and Lindberg, enumerated about 600 species as belonging to the Flora of Norway.

"In more recent years several sons of the fatherland have scrutinized the status of mosses as never before, and have investigated their distribution. And up to the present time 1100 species of mosses are known to occur in Norway.

"This list likewise, which includes some rarer mosses, especially those observed in more recent years in various localities of the country, will increase this number."

In other words, all the Hepaticæ, and Musci enumerated here are additions to the Moss Flora of Norway! This is of interest to American students because of the close kinship of the Arctic-American Moss-Flora with that of Norway. One new variety is described; *Bryum neodamense fragile* Bryhn. But the matter of most interest to all moss students is Dr. Bryhn's note under *Amblystegium juratzkanum* Schimp., embodying as it does the result of the author's careful study of this and the closely related species of *Amblystegium*. I here cannot do better than to quote his words in full.

‘I have diligently examined numerous specimens of this species from various countries and stations, and have compared them with all those specimens of *Amblystegium radicale* (P. B.) Mitt. (in sensu Limprichtii) which I possess, and likewise with specimens collected in various places in Europe; nevertheless to find a sufficiently pronounced difference has been impossible to me. The same conclusion has been reached by the noted bryologists, Schiffner and Moenkemeyer.

‘I do not doubt but that the result will be the same if one should compare *Amblystegium virens* Haus. with *Amblystegium juratzkanum*.’

This disposition of one of the most vexing groups of species, or rather of one of the most polymorphous species of pleurocarpous mosses, like the cleaving of the Gordian Knot, will be a great relief to many who have floundered here.

JOHN M. HOLZINGER.

**Forarbejder til en Norsk Lovmosflora. Av I. Hagen. (Kgl. Norsk Videnskabers Selskabs Skrifter; 1909, No. 5, and 1910, No. 1).
Trondhjem, Norway, 1909 and 1910.**

The first two parts of Dr. Hagen's Norwegian Moss-Flora have already been noticed in THE BRYOLOGIST for September, 1909. The present issues include the families Grimmiaceae Timmiaceae, Schistostegaceae, Hedwigiaceae, Splachnaceae, Oedipodiaceae, Leucodontaceae, Ceratodontaceae, Encalyptaceae, and Seligeriaceae.

The main portion of the text is in Norwegian, but all critical notes are in French, while the keys and synopses of new forms are in Latin. No new species are described, but several varieties are proposed as new, besides four new subgenera and one new genus. The latter, *Pseudephemerum* (Lindb.) Hagen, is constituted for *Pleuridium axillare* Dicks. which is considered to be most closely allied to *Dicranella rufescens*. The family Ceratodontaceae is here extended to include the Norwegian species classified by Brotherus in the sub-family Ditricheae.

Of particular interest are the notes upon *Grimmia calvescens* Kindb. *G. apocarpa* Hedw., *Seligeria brevifolia* Lindb., *S. pusilla* Bry. Eur., *S. paludosa* L., and the figure giving the relationships of the various species of Encalypta. Figures are given showing the branched male inflorescence of *Schistostega*, and the capsules of *Seligeria brevifolia*.

EDWARD B. CHAMBERLAIN.

Necrology.—Attention is called to the death of Nils Conrad Kindberg on August 23d, 1910, at Upsala, Sweden. He was 78 years old. From 1860 to 1901 he was a teacher, lecturer, etc., at Linköping, after which time he resided at Upsala as Emeritus Professor on a pension. The last 30 years of his life was devoted almost exclusively to North American bryology.

His valuable collection of mosses, containing about four thousand species, from numerous localities, especially North America, is for sale. For further information, as to price, etc., address Dr. H. W. Arnell, Upsala, Sweden.

REPORT OF ELECTION

For Officers of the Sullivant Moss Society for 1911.

Whole number of votes cast	13
For President, Dr. Alexander W. Evans.....	12
For " Mr. George B. Kaiser.....	1
For Vice-President, Miss C. C. Haynes	13
For Secretary, Mr. N. L. T. Nelson.....	13
For Treasurer, Mrs. Annie Morrill Smith.	13

Therefore Dr. Evans, Miss Haynes, Mr. Nelson and Mrs. Smith are elected.

Respectfully submitted,

A. J. GROUT,

Judge of Election.

PRESIDENT'S REPORT.

The president for 1910 scarcely has an official report for he knows that his part in the success of the Society for the year has been very small. He has tried to aid occasionally in determining difficult species of lichens and has attempted to help as much as he could by advice and encouragement; but the burden has fallen upon others to whom great credit is due.

It is now thirteen years since the first number of *THE BRYOLOGIST* appeared as a four-page journal, reprinted from volume six of *The Fern Bulletin*. The first volume aggregated only 28 pages. We now have an independent journal, each number of which contains nearly as many pages and considerably more reading matter than did all of the first volume. For the continued growth of *THE BRYOLOGIST* in size and quality, we are mainly indebted to Dr. A. J. Grout and Mrs. Annie Morrill Smith as sole or joint editors. To these persons more than any others we are also under obligations for the increase in membership from 30 to more than 200.

The rank and file of an organization is always to be credited with its aid in success and the Sullivant Moss Society is especially fortunate in the faithfulness of its members. But far outweighing the sacrifices of others during the year 1910 stands the untiring interest and devotion of our present editor, under whose wise and energetic management *THE BRYOLOGIST* has constantly increased in size, quality and interest. Indeed, our Journal is considerably better than could be maintained by our subscriptions, and every member should try to aid in increasing the membership and support.

The success of the work on Mosses and Hepatics seems assured. Still there is need of intensive study in almost every locality, for only in this way can our bryophyte flora ever be thoroughly known. The origin of the Lichen department was stated in the last number of our Journal, in the memoir of Carolyn W. Harris. There is the greatest need of careful field study of our lichens, and those of us who are especially interested in these plants are under great obligations to the Society for giving us space and encouragement. Students of lichens should ever hold in affectionate remembrance the

lamented member who was instrumental in starting the work and in arousing interest. We are likewise much indebted to Mr. G. K. Merrill and to Miss Mary F. Miller for aid in determining thousands of specimens.

It is certain that the members of the Society will continue loyal and interested in the work and that yet greater success for the Society and its Journal lies in the future. In closing the retiring president wishes to thank the Society for the high honor conferred upon him and to congratulate it upon its ever increasing field of usefulness.

BRUCE FINK,
Oxford, Ohio.

REPORT OF THE SECRETARY.

The Sullivan Moss Society began the year 1909 with 184 members and 1910 with 187 members. During the year 19 have joined us, 11 have withdrawn and 5 have died—therefore, we start the new year with 190 members.

Died—Prof. Ch. R. Barnes, Mr. James Graves, Mrs. Carolyn W. Harris, Mr. Ernest Morgan and M. Renuald. Several of those who have withdrawn have done so only temporarily and have continued subscribers of *THE BRYOLOGIST* so that the reduction is only a change from one class to another.

The herbarium has been enriched during the year by about 100 mounts. Of donated specimens Prof. John L. Sheldon, of the West Virginia State University contributed nearly 50 mounts. Prof. E. B. Chamberlain contributed nearly as many. Of this number the majority comes from Italy, collected by Mr. Corti. Among those who contributed through Prof. Chamberlain were Messrs. Brotherus, Hagen, Waddell, Iishiba and Okamura—representing Finland, Norway, Ireland and Japan. A number of mounts have not yet been incorporated in the Herbarium.

Members should bear the collection in mind and send in interesting finds. They will be acknowledged, appreciated and used.

During the year the secretary has had the helpful suggestions of many members. He has tried to get in touch with all the members so far as time permitted.

During 1908, fifty mosses were offered to members. During 1909 the number increased to 77, while in 1910—82 were offered by about 30 members. A large number of hepatics and lichens were also offered.

Every active member should offer at least a specimen a year—as uncommon as possible. The voluntary offerings this year have been fairly numerous. To some extent, this has relieved the secretary of the necessity of making personal requests for the same.

Something of interest to others may be found in every locality.

I would repeat what I said a year ago with reference to a "Moss Exchange bureau." Many members have numerous duplicates—or they can easily get duplicates of mosses common in their locality. They would very substantially increase their own collections by exchanging them for specimens rare, or absent in their localities, but common elsewhere.

N. L. T. NELSON,
Des Moines, Iowa.

THE REPORT OF THE TREASURER.

The following statement of the year beginning December 1st, 1909, and ending December 1st, 1910, is respectfully submitted:

RECEIPTS.

By cash on hand December 1st, 1909	\$ 84.60
By dues from members.....	231.30

DISBURSEMENTS.	\$315.90
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To THE BRYOLOGIST	\$188.55
To Postage, \$7.00; Envelopes and Billheads, \$4 50; Boston Meeting, \$1.00.....	12.50
	\$201.05
To Cash on hand December 1st, 1910.....	114.85
	\$315 90

REPORT OF THE CUSTODIAN OF THE HEPATIC DEPARTMENT.

The interest of the members in the Hepatic Department during the past year, while not large has been of unusual moment in regard to character rather than quantity of material submitted. Two hundred and sixty-two specimens have been added to the Herbarium, making the total number of specimens, two thousand, one hundred and sixty-nine.

A set of forty-two packets, representing fifteen species, has been of especial note. This was collected by Mr. C. C. Kingman at Pasadena, Santa Catalina Island, and Santa Barbara, California. From this set the following species were added for the first time to the Herbarium: *Porella Bolanderi* (Aust.) Pearson, *Fosombronia longiseta* Aust., *Frullania Catalinae* Evans, *Riccia trichocarpa* M. A. Howe, *Asterella Californica* (Hampe) Underwood, *Asterella Palmeri* (Aust.) Underwood, and *Riccia glauca* L. and *Cephaloziella Starkii* Nees were added for the first time from North America.

Miss Lorenz kindly sent the Herbarium some of the Alpine species collected in Europe and described in the last issued of THE BRYOLOGIST. Among those was one of *Pedinophyllum interruptum* (Nees) Pearsons. This has been described by Dr. Evans in his notes in Rhodora for Oct. 1910. Earlier in the year Miss Lorenz also added *Lophozia longiflora* (Nees) Schiffn. Both of these species are new to the Herbarium.

Miss Haynes secured by exchange, thirty-four species from Ireland, which were collected by the Rev. C. H. Waddell, Saintfield, County Down, Ireland. Among these is for us a new *Lophozia*, *L. turbinata* (Raddi) Steph. In a like manner a set of twelve species was secured from the Rev. P. G. M. Rhodes, Kidderminster, England, one of which, *Cephaloziella aeraria* Pearson is new also.

From Brother Victorin, Longneuil College, Province of Quebec, Canada

comes the beginning of a set of Hepaticae from that locality. Prof. John L. Sheldon, of Morgantown, W. Va., continues to send good things. Among them two new accessions, *Pellea Fabroniana* Raddi, and *Metzgeria crassilipis* Lindb. Two other species also new were added, *Marsupella apiculata* Schiffn., by Miss Haynes, and *Lophozia Kaurini* (Limpr.) Steph. by Mr. Louis Dutton. This last named species is described by Dr. Evans in his notes in Rhodora, Oct. 1910. *Nardia Geoscyphus* (De Not.) Lindb. was sent by Miss Helen E. Greenwood from Worcester, Mass. This is the second station for Massachusetts and fourth for the United States.

During the year contributions arrived from A. S. Foster, of Washington; Prof. J. P. Naylor, Greencastle, Indiana; Rev. Jas. Hanson, Collegeville, Minn.; and Dr. H. S. Jewett, of Dayton, Ohio. Mr. Louis Dutton, of Brandon, Vt., continues his set of "Vermont Hepaticae." Mr. George B. Kaiser, of Germantown, Pa., contributed a collection of fifty-four packets, representing twenty-seven species, all unusually fine specimens.

Additions have been made to the writer's set from the "Duluth-Superior" district now numbering sixty-five species.

Miss Caroline Coventry Haynes continues to remember us with her set of "American Hepaticae," numbers 60 to 80.

It has been observed that beginners are often prevented from sending specimens to the Herbarium on account of the impression that the material is common and therefore valueless, and a beginning in the study of bryological forms is delayed year after year because of this. If one should gather, however, the more common forms and really start a Herbarium and have each species verified by a department of the society, it would be a matter of surprise how quickly knowledge of these plants would be attained, and a good Herbarium built up. The departments of the society and the three Herbaria were designed especially to aid the beginner. Nothing delights those in charge more than a real live student who asks questions.

It gives me pleasure to acknowledge the prompt and efficient aid which Miss Haynes and Dr. Evans has always given in determining difficult species.

GEORGE HALL CONKLIN, M.D.

Superior, Wisconsin.

REPORT OF THE LICHEN DEPARTMENT.

The year 1910 has been a prosperous one for the Lichen Department. Many members have contributed generously to the herbarium, and the majority of the specimens sent in for identification have been good ones, carefully prepared and labeled. Mr. Kaiser has contributed a fine collection of 74 specimens from New England and the Middle States; Mr. Pendleton and Mr. Kingman have sent a number of lichens from California; Mr. Nelson from Colorado; Mrs. Leavitt from Massachusetts; Mr. Kirk from Vermont; and others smaller collections have been received from various parts of North America. Our foreign members have also remembered us: Mr. E. Iishiba sent a valuable contribution of 126 lichens from Japan; and another fine set of 62 specimens came from Miss Flockton, of Sydney,

Australia. This last through the kindness of Mrs. Carolyn W. Harris. A large number of these specimens have yet to be studied and named, and placed in the herbarium.

There are, at the present date, 1154 specimens in the lichen herbarium, representing 57 genera and 400 species and varieties; 283 specimens have been added during the year, 43 being new to the herbarium. Prof. Fink has kindly assisted me in determining difficult specimens.

As usual, duplicates have been used for purposes of exchange, and also in assisting beginners in becoming acquainted with the various genera and species. During the coming year we hope to exchange more extensively with foreign members, and for this purpose our most common native lichens can be used to advantage, so let no one hesitate to contribute the common species, for they are just as useful as the rare ones.

MARY F. MILLER, Custodian.

EDITORIAL NOTE—TO MEMBERS OF SULLIVANT MOSS SOCIETY AND SUBSCRIBERS TO THE BRYOLOGIST.

The reorganization of *THE BRYOLOGIST* and the Sullivant Moss Society as outlined in my recent circular letter is now completed.

THE BRYOLOGIST on January 1, 1911, becomes the property of the Sullivant Moss Society, and its officers constitute the "Advisory Board," and in the future will assume all responsibility for its publication. Dr. A. J. Grout has accepted the position of Editor-in-chief, and all manuscripts and communications of an editorial nature should go directly to him. He will publish the journal at New Dorp, and will have charge of the back numbers, selling the files, also odd numbers, for the benefit of the Society. There will be four "Associate Editors," representing the four groups treated of in *THE BRYOLOGIST*, that is, the Acrocarpous Mosses, Pleurocarpous Mosses, the Hepatics, and the Lichens, the names being announced in the March number.

The Custodians of the Society Herbaria remain the same as last year, and all material for identification should be sent to the respective custodians, as also all material for Offerings; in this way each department may vouch for the correct identification, and advise as to selection of material, correct citations, etc. These specimens are incorporated in the three-fold herbaria, and belong to the Society and not to the individual custodian, unless sent in duplicate. Hereafter specimens need not be sent to me unless requested.

As Treasurer of the Society all monies must be sent directly to me. Sullivant Moss Society members in the United States should forward \$1.50; those in Canada and all foreign countries \$1.60; these amounts cover the subscription to *THE BRYOLOGIST*. Those who subscribe for the journal only, and are not members of the S. M. Society should send, in this country, \$.25, and in Canada and all foreign countries \$.35.

I take this occasion to thank the large number who have so promptly

responded to my late circular letter, and who have promised the same loyal support in the future that they have shown me in the past. I also heartily endorse Dr. Grout's letter printed herewith, and confidently urge your personal co-operation toward making *THE BRYOLOGIST* a more useful publication.

ANNIE MORRILL SMITH.

NEW DORP, RICHMOND CO., NEW YORK.

Jan. 1, 1911.

MEMBERS OF THE SULLIVANT MOSS SOCIETY:

At a considerable personal sacrifice I have undertaken the care of *THE BRYOLOGIST* for the coming year. I cannot give it the care and devotion that Mrs. Smith has given it during the past ten years and I shall have to have more help. It is to suggest ways of helping that this letter is written. For one thing I want more short notes on mosses, as the lichen people seem to be far more active than the moss people. Also we must pay more attention to our advertising. Our income will pay for the plain printing but will not pay for engraving of cuts. Whenever you buy anything advertised in our columns be sure to mention that you saw the ad. in *THE BRYOLOGIST*. If this be done we can get enough from our advertising to pay for our cuts.

Also, if you have anything to advertise, give us a chance to show what we can do for you.

Respectfully yours,

A. J. GROUT.

SULLIVANT MOSS SOCIETY MEMBERS.

* Star indicates Charter Members.

1. Adam, Mr. F. M., Box 515, Sharon, Mass. M.
2. Adams, Miss Carrie E., R. F. D. 1, Hinsdale, N. H. M.
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17. Braun, Miss E. Lucy, 2702 May Street, Cincinnati, Ohio. L.
18. Brinkman, Mr. A., Box 66, Stettler, Alberta, Canada. M.
19. Bristol, Prof. W. E., Syrian Protestant College, Beirût, Syria. M. H.

20. *Britton, Mrs. E. G., New York Bot. Garden, Bronx Park, N.Y. M.
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23. Browne, Mr. Arthur S., Brunswick School, Greenwich, Conn. M.
24. Browne, Miss Carlotta H., 871 N. 41st st., Philadelphia, Pa. M.
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26. Burnham, Mr. Stewart H., Capitol Museum, Albany, N.Y. M. H. L.
27. Calkins, Mr. W. W., Berwyn, Cook Co., Illinois. M. L.
28. Cardot, M. Jules, Square du Petit Bois, Charleville, Ardennes, France. M.
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30. Carter, Prof. Charles, Parsons College, Fairfield, Iowa.
31. *Carter, Mrs. R. H., 37 Church St., Laconia, N. H. M. H. L.
32. *Chamberlain, Mr. E. B., 38 West 59th St., New York City. M. H.
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39. Clapp, Miss M. S., 24 Salcombe St., Dorchester, Mass. M.
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56. Dobbin, Mr. Frank, Box 197, Shushan, New York. M.
57. Dunham, Mrs. Elizabeth M., 53 Maple St., Auburndale, Mass. M. H.
58. Dupret, Rev. H., Seminary of Philosophy, Montreal, Can. M. H. L.
59. Dutton, Mr. D. Lewis, R. F. D. 2, Brandon, Vermont. M. H.
60. Eaton, Dr. Cora Smith, 1604 E. Union St., Seattle, Wash. M.
61. Eckfeldt, Dr. J. W., 345 North 65th St., Philadelphia, Pa. M.
62. Evans, Alexander W., Ph.D., 67 Mansfield St., New Haven, Conn. H.
63. Fink, Prof. Bruce, Ph.D., Miami University, Oxford, Ohio. L.
64. Fitzpatrick, Prof. T. J., Lamoni, Decatur Co., Iowa. L.

65. Fleischer, Prof. Max, 5 Tanah-Ahang, Batavia, Java, Netherlands India. M.
66. Fletcher, Mr. S. W., Pepperell, Mass. M.
67. Flett, Prof. J. B., 107 N. Tacoma Ave., Tacoma, Wash. M. L.
68. Flockton, Miss Margaret, Coulter St., Gladesville, near Sydney, Australia. L.
69. Foster, Prof. A. S., Pacific Beach, Chehalis Co., Wash. M. H. L.
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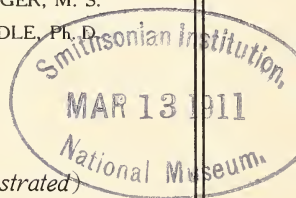
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No. 2

NEW ENGLAND LOPHOZIAS OF THE MUELLERI-GROUP

ANNIE LORENZ.

[Presented at the Sullivant Moss Society Meeting, Minneapolis, Dec. 28, 1910.]

Schiffner¹, in one of his most brilliant papers, discusses the tangled limestone Lophozias known as the Muelleri-group, or as Müller² calls them, § *Leicolea* of *Lophozia*. He takes up nineteen species as given by various authors, and concentrates them into seven, so clearly that each requires but a few words of characterization; while Müller, in *Lieferung 12*, follows him closely.

Dr. Evans³ says of this group "leaves always bifid; underleaves more or less developed, even on slender stems; perichaetial bracts usually but little differentiated from the leaves; perianth cylindrical or barrel-shaped, terete (or slightly plicate in the upper part), contracted into a tubular beak; perigonal bracts with a third dorsal tooth."

Of the seven, all but one, the southern-ranging *Lophozia turbinata* (Raddi) St., are reported from North America. Two are now known from New England, *L. Kaurini* (Limpr.) St., and *L. badensis* (Gottsche) Schiffn. The writer had the good fortune to discover the former on July 4, 1910, in Quechee Gulf, Hartford, Vermont, during the summer meeting of the Vermont Botanical Club, and it is reported by Dr. Evans in *Rhodora* for October, 1910. This is the second station known from North America, the previous one being at Hunker Creek, Yukon Territory, ⁴ where Macoun collected it.

The plants agree very closely with the original specimens collected by Kaurin at Opdal, Luengen, Norway, which were also the blunt-lobed form. This may explain why Limpricht considered this as the type, instead of the commoner acute-lobed form, which he called var. *acutifolia*; whereupon Müller comments.⁵

Quechee Gulf has been worn down by the Ottaquechee River to a depth of about 100 ft. in the deepest part, through calciferous mica schist containing some hornblende; the Gulf is also crossed slantingly by a trap dyke. *Lophozia Kaurini* was plentiful upon the damp, sunny ledges of the Gulf, and bore abundant young perianths, with their noticeable beaks. These plants were of an olive-yellowish-green shade, rather than a bright green.

1. Verhandl. der K. K. Zool.-botan. Gesellsch. in Wien **54**:381-405. 1904.

2. Rabenhorst's Kryptogamen-Flora **6**:711. 1910.

3. *Rhodora* **8**:35. 1906.

4. Evans, Yukon Hepaticae, p. 20. 1903.

5. Rabenhorst's Kryptogamen-Flora **6**: 719, 1910.

Associated with them were *Preissia quadrata*, *Pellia Fabroniana*, *Lophozia badensis* (Gottsche) Schiffn., which will be considered later. *Plagiochila asplenoides*, *Lophocolea minor*, *Scapania nemorosa*, *Rhabdoweisia denticulata*, *Distichium capillaceum*, *Mnium* sp., *Myurella Careyana*, *Tofieldia palustris*, *Parnassia Caroliniana*, *Erigeron hyssopifolius*.

Kaalaas* who, of all the European writers, gives the most careful and necessarily detailed description of the habitats of the various species, speaks of *Lophozia Kaurini* as follows:—"This plant, which already for over fifty years past has been collected in Norway, but only recently has been recognized as a separate species, grows on shady, moss-grown, somewhat damp cliffs, by brooks and water, as well as upon damp sandy soil, as a rule on a substratum of loose clay schist; according to Arnell, it is said also to occur on limestone, and occasionally upon rotten trunks. But seldom are there pure tufts of any great extent, it grows most often mixed with different mosses, most frequently perhaps in company with *Sphenolobus politus*. The species belongs essentially to the arctic and alpine flora and seems to have a very wide distribution in Norway's mountain region, * * * in the higher-lying regions where schists form the mountain structure, it seems to be tolerably common."

"Its most frequent occurrence seems to be in the uppermost part of the forest region and in the birch belt, or, in the middle of Norway, from 5-800 m. alt., but it climbs also up above timberline into the alpine region. * * * The species is commonly with perianths and fruit, which develops in July-August. Like most species of the Muellieri-group, *L. Kaurini* possesses also in fresh condition a strongly aromatic odor."

Bernet¹ describes it under the name of *Lophozia Mulleri parvica* Bernet, and gives an excellent plate, but as the Vermont plants are referable rather to var. *obtusiloba*, some figures are given with these notes.

Limpricht² says "Perichaetial bracts not larger than the neighboring leaves," but Müller³ says "Hüllblätter kielig gefaltet, etwas grösser als die anderen Blätter," and this agrees with the Vermont plants.

Schiffner⁴ dismisses it with a list of references, and the remark "It is certainly a good species."

Lindb. & Arnell⁵ give stations, "At Uskij-mys on damp clay-slate rocks with *Lophozia Lyoni*, *Reboulia*, and *Pohlia cruda*: * * * on a

*. De Distr. Hep. in Norv. p. 363, 1893.

1. Cat. Hep. de la Sud-ouest de la Suisse, pl. 3. 1888.

2. 61. Jahresber. der Schlesischen Ges. für Vaterl. Culture. 1884.

3. Rabenhorst's Kryptogamen-Flora 6: 1910.

4. Verhandl. der K. K. Zool. botan. Gesellsch. in Wien. 1904.

5. Musci As. Bor. p. 45. 1889

damp rotten trunk with *L. heterocolpos* and *Blepharostoma*, * * * on damp limestone; on the Nikandrovsky Island abundant on slimy mucky ground with *Leptobryum*, &c."

Macvicar¹ states that *Lophozia Kaurini* is very rare in Scotland, but one station being known, in Caithness.

Lophozia Kaurini is to be expected among the limestone portions of the Berkshires, and perhaps also in the practically unexplored region of northern Maine.

Lophozia badensis (Gottsche) Schiffn. to which reference is made in the beginning of this paper, was also abundant on the damp rocks of Quechee Gulf, growing mixed chiefly with *Rhabdoweisia*. Although our smallest species of this group, it is easily recognizable in the field by its neat and characteristic little perianths.

In Rhodora for October, 1910, Dr. Evans reports this new station, and as his plants from Salisbury, Conn., which he had formerly referred to *Lophozia Muelleri* (Nees) Dum., agree closely with these, he revises his previous determination, thus omitting entirely *L. Muelleri* itself from the New England List.

While *L. Muelleri* and *L. badensis* are very closely related, most of the European writers consider them distinct, and of these Schiffner² is the most emphatic.

Besides the differences upon which weight is usually laid, in that *L. badensis* has slightly larger leaf-cells with smaller trigones, and the lack of under leaves, he gives what he considers an absolute proof of their right to be separate species, namely, the respective forms of their ♂ inflorescences.

In refuting the views of some writers, that *L. badensis* is only a depauperate or juvenile form of *L. Muelleri*, he says "that the unusual fertility of the plant speaks decidedly against both these views." Then he describes some Austrian specimens, coll. Baumgartner, which appeared to be intermediate between *L. badensis* and *L. Muelleri*. But, "the few ♂ plants show the andrœcium compressed into a thick bud on the tip of the stem * * *. This form of andrœcium is extraordinarily characteristic of *L. Muelleri*, and is totally different from the arrangements of *L. badensis*, in which the andrœcium is intercalary, the perigonal bracts widely separated, and of quite different form (the ♂ plants, in my opinion, offer a safe and sure method of distinguishing small forms of *L. Muelleri* from *L. badensis*)."

These Vermont plants have intercalary andrœcia of exactly this loosely-leaved description, such ♂ bracts as are near the tips of the stems are very young and not imbricated.

1. Trans. Bot. Soc. of Edinburgh, **25**: 141. 1910.

2. Ber. d. natur-med. Verein "Lotos," p. 31. 1905.

Kaalaas¹ gives the following as the habitat of *L. badensis*: "This species occurs as it seems upon slightly damp and sandy earth, on thinly earth-covered cliffs, in humus-filled mountain crevices, etc., on a substratum of rocks containing more or less lime. * * * *L. badensis* is not rare with us, in such regions, * * * and it occurs especially in the northern part of the country. * * * As a rule it is found with perianths, and frequently also with fruit."

Schiffner² declares that *L. badensis* and the southern *L. turbinata* (Raddi) St., have until very recently been confused, even by careful writers like Bernet and Warnstorf. Lindberg³, however, in a most excellent manner sets forth their differences and gives diagnoses of both. After describing them he says of them respectively;

L. badensis. "Terras septentrionales praefert," and gives a long list of Scandinavian stations.

L. turbinata. "Terras meridionales et occidentales praefert, nondum intra fines florum scandinaviae reperta, ubi tamen antecedens nullo modo rara esse videtur, ut loca supra relata demonstrant."

Macvicar⁴ gives a number of stations for *L. badensis* and says that in Scotland it is found only upon low ground.

Müller⁵ in Heft 12, gives a very good list of the differences between *L. badensis* and *L. Muelleri*, as well as some figures of each species.

As for its North American distribution, Dr. Evans⁶ gives it, "from King Oscar Land and Ellesmere Land from along the Montmorency River, Quebec, coll. Macoun;" from Ithaca, New York, coll. Andrews; "probably has an extensive range in North America."

Hitchcock, in his Geology of Vermont (1861) describes such a variety of geological formations within the state as easily explains why, with but little systematic exploration, Vermont has so many rarities credited to her list. Her limestone hills and swamps ought to yield all further possible members of the *Muelleri* group—surely *L. Muelleri* (Nees) Dum. itself, and *L. Schultzii* (Nees) Schiffn.

Since, however, in comparing specimens, all Vermont mosses resemble more closely those from Norway than from any other part of Europe, perhaps it is not unreasonable to expect that a large proportion of Norway's rich hepatic flora must occur in Vermont.

In conclusion, the writer will be very glad of material of any species of this group for examination, from any part of North America, as this group has hitherto been sparingly collected in America.

Hartford, Connecticut, November, 1910.

1. De Distr. Hep. in Norv., p. 351. 1893.
2. Verhandlungen der K. K. Zool. bot. Gesellesch in Wien, **54**: 394-5. 1904.
3. Musci. Asiae Bor. I: p. 46. 1889.
4. Trans. Bot. Soc. of Edinburgh, **25**: 138. 1910.
5. Rabenhorst's Kryptogamen-Flora, **6**: 733. 1910.
6. Bryologist, **13**: 343, Mar. 1910.

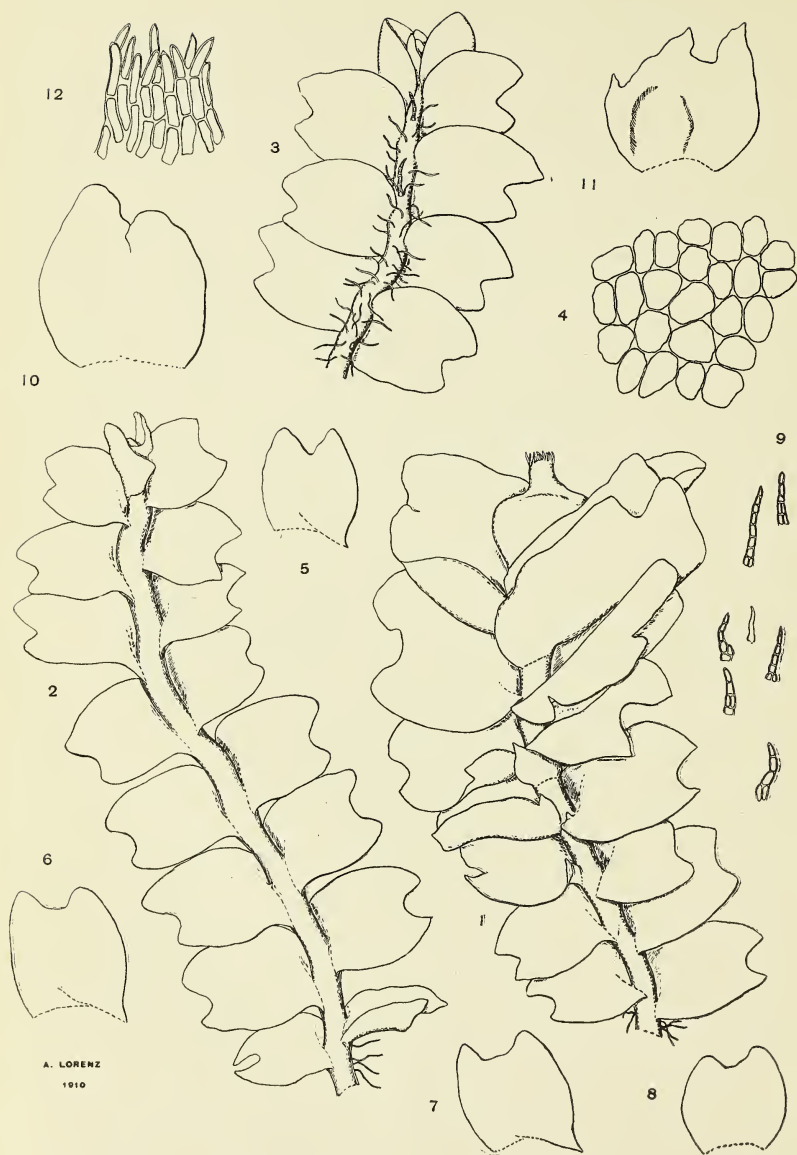


PLATE IV. *Lophozia Kaurini*

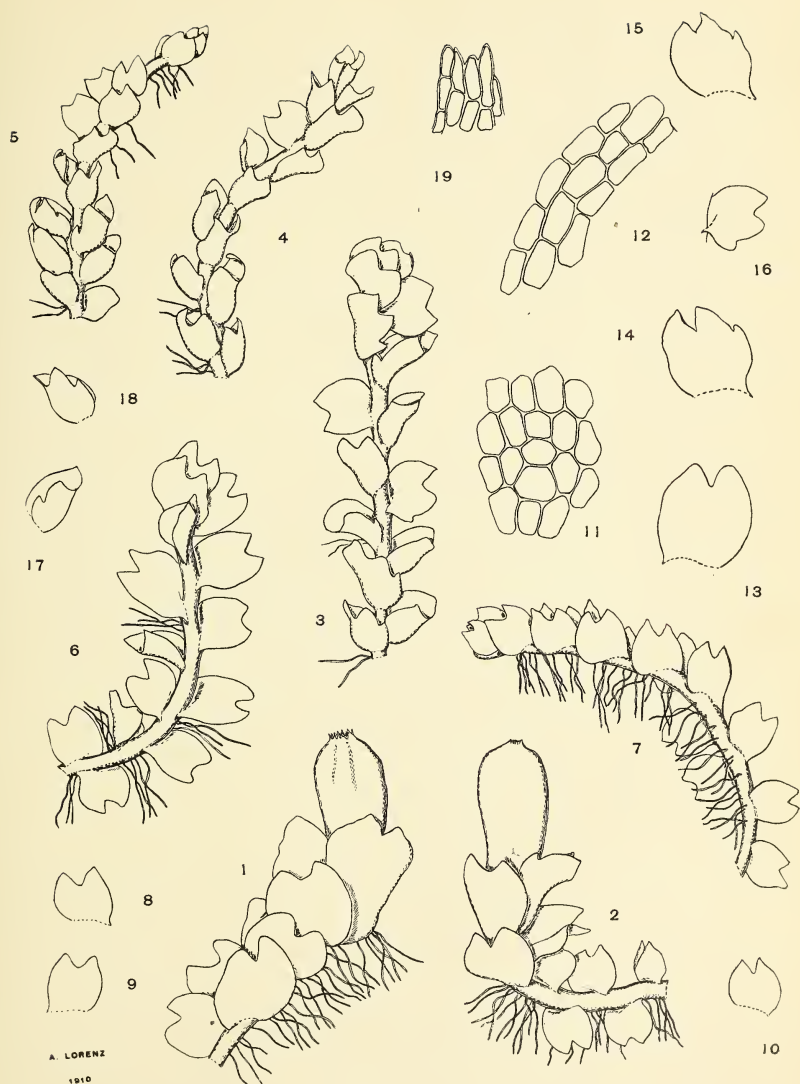


PLATE V. *Lophozia badensis*

EXPLANATION OF PLATE IV

Lophozia Kaurini (Limpr.) St.

1. Plant with perianth and ♂ bracts. × 87.
 2. Sterile plant. × 87.
 3. Plant, postical view, showing underleaves. × 87.
 4. Leafcells. × 570.
 - 5, 6, 7, 8. Leaves. × 87.
 9. Underleaves. × 87.
 10. Perichaetial bract. × 87.
 11. Perigonial bract. × 87,
 12. Cells from mouth of perianth. × 87.
- All reduced to two-fifths original size.

All figures from specimens (No. 769) collected by the writer at Hartford, Vermont.

EXPLANATION OF PLATE V

Lophozia badensis (Gottsche) Schiffn.

- 1, 2 Plants with perianths. × 87.
 - 3, 4, 5. Plants with androecia. × 87.
 - 6, 7. Sterile plants. × 87.
 - 8, 9, 10. Leaves. × 87.
 11. Leaf-cells. × 570.
 12. Cells of outer layer of stem. × 570.
 - 13, 14, 15. Perichaetial bracts. × 87.
 - 16, 17, 18. Perigonial bracts. × 87.
 19. Cells from mouth of perianth. × 570.
- All reduced to two-fifths original size.

All figures from specimens (No. 770) collected by the writer at Hartford, Vermont.

A NEW GRIMMIA OF THE SECTION SCHISTIDIUM

JOHN M. HOLZINGER.

[Read at the meeting of the S. M. S., Minneapolis, Dec. 28, 1910.]

In the July (1910) issue of the *Bryologist* I reported "Some Additions to the Moss Flora of the United States." Among these was a plant collected in 1904 by G. C. Britton near Catala, Alaska, and communicated to me by Prof. J. B. Flett as No. 5. As it differed from the *Schistidium*s I knew, I tried to "match" it with some of the arctic species, European and American. On close comparison it was found to be identical with No. 80a of Canadian Mosses distributed by Prof.

John Macoun and determined by the late N. C. Kindberg as *Grimmia Agassizii* Lesq. & James. On comparing these plants with the description in the Manual I noticed a number of discrepancies which I recorded in my published note referred to above.

Mrs. E. G. Britton, inferring correctly that I had not the type of *Grimmia Agassizii* kindly sent me a part of the type, a close examination of which disclosed the fact that *G. Agassizii vera* is a quite different thing from Can. Musci 80a and the Alaskan plant.

Further investigation of descriptions and plants of arctic *Grimmias* led me to conclude that this is an undescribed species of the section *Schistidium*, differing decidedly from the nearly related *G. Agassizii* and *G. maritima* in important respects, chief among which is the bistratose leaf lamina. After searching the list of published names of *Grimmia* species, to make sure that I am not duplicating a name, I have decided to name this plant—

Grimmia (§. *Schistidium*) **Kindbergii**. In light green cushions on earth (?). Plants about an inch high, sparingly branched. Leaves slightly curled at top when dry, straightening when moistened; brittle and easily torn in dissection; the lower narrowly triangular, the upper and comal rapidly becoming more than twice the length of the lower, gradually widening from the narrow base to about the middle, then narrowing more abruptly to a slender subulate apex, which is entered but not reached by the thick terete costa. Leaf margin entire, but made to appear slightly toothed by the projection of low broad papillae, which cover both sides of leaf above the middle. Areolation in the lower part, for nearly half the distance, pellucid and elongate rectangular, becoming shorter and isodiametric as they meet the opaque cells of the upper part. Leaf section *bistratose* becoming *unistratose*, sporadically, below the middle.

Capsule: dry or wet, perfectly smooth (not wrinkled), transparent pale-yellow, short-oval, surmounted by a stout-beaked operculum, the beak as long as the operculum is wide; vaginule apparently lacking paraphyses, longer than the short seta; and it, with seta and beaked capsule, is barely half as long as the perichaetial leaves.

Teeth of peristome as described for *Gr. Agassizii* in the Manual, i.e., "dark red, thick and entire below, pale and cribose above."

Spores (not quite ripe), smooth, pale yellow, 22-26 μ .

As I stated in the July Bryologist, p 85, this species is at once known by its pale green color, the soft, tender leaves quite devoid of hair points, straight when moist, and by the clearly *bistratose lamina*.

Type station: Catala, Alaska.

Collector: Mr. G. C. Britton U. S. Commissioner in 1904.

Type in the herbarium of Prof. J. B. Flett, and of the author.

Winona, Minn.

NOTES ON HEPATICAE OF SOUTHERN CALIFORNIA

C. C. KINGMAN

[Presented at the Sullivant Moss Society Meeting, Minneapolis, Dec. 28, 1910.]

Dr. M. A. Howe, in his "Hepaticae and Anthocerotae of California" mentions over eighty species of hepatics as occurring in the state. Only a small number of these species however are to be found in the southern portion of the state. In Southern California the country is for the most part very dry except during the winter months and there are no meadows and swamps, and but few trees. Even the mountain streams are dry the greater part of the year. Under these conditions one would not expect to find a great number of hepatics, yet certain species seem to thrive quite abundantly.

During my past year in California I have explored quite thoroughly the region about Pasadena, Cal., including the canyons of the San Gabriel Mountains, besides visiting Catalina Island and Santa Barbara.

Just outside the city the foothills begin to rise. The soil is a coarse gravel, and during the winter months this gravel is thickly covered with large patches of *Fossombronina longiseta* Aust. This species fruits quite freely in March, and a few weeks later, after the rains cease, the plant dries up and disappears. Often one will find *Riccia trichocarpa* M. A. Howe, mixed with the *Fossombronina*. This is the commonest of our Riccias and may be recognized by its grayish appearance, due to the small white cilia on the margin of the thallus. I found this species quite abundant last July at the Avalon golf links on Catalina Island, although the plant was hardly recognizable on account of its dried up condition. *Riccia glauca* is a larger species with wider and less divided thallus and the margins are without cilia. It is occasionally found growing on shady banks.

The San Gabriel Mountains are cut up by numerous canyons. These canyon walls are often very steep, and there is usually a mountain stream running down through the canyon and forming a series of pretty waterfalls and cascades. Here, on the damp rocks, *Porella Bolanderi* (Aust.) Pearson grows in great profusion, often covering large areas. Occasionally this species is found growing on trees. It is a variable species, with some forms resembling *Porella rivularis*.

In the smaller canyons, among the ferns, are a number of interesting hepatics. There is *Cryptomitrium tenerum* (Hook.) Aust., which in early spring sends up its stalked receptacles resembling tiny umbrellas; also *Targionia hypophylla* L., which bears its fruit on the under side of the thallus at the apex. This is our commonest hepatic, and may be found at all seasons of the year on any shady bank. I found it abundant this summer at Santa Barbara and Catalina Island.

Shady banks will also yield several species of *Anthoceros*. These species, which are similar in appearance, are most easily determined by their spores. *Anthoceros fusiformis* Aust. is the largest species and

has black spores which are papillose, while *Anthoceros Pearsoni* M. A. Howe has yellow spores with crescentic markings. This latter species is by far the most common. It is not rare at Catalina Island, and at Santa Barbara I saw a bank thickly covered with it and extending for several hundred yards.

Among the more conspicuous hepatics are the *Asterellas*. These plants may be found as early as November, but the fruit does not fully mature until March. *Asterella California* (Hampe) Underw. is the commonest species. This plant is dioicous and both male and female plants may usually be found growing near together. The receptacles in this species are 4-lobed. *Asterella Palmeri* (Aust.) Underw. grows in more sunny places. This species is monoicous and the receptacle is not lobed, but conical.

The genus *Cephaloziella* is represented here by two species. *Cephaloziella Starkii* (Nees) Schiffn. is nearly, if not quite, identical with *C. divaricata* (Sm.) Schiffn. while *Cephaloziella divaricata scabra* (M. A. Howe) may be recognized by its serrulate leaves which have several large papillae on their under sides. Both of these interesting species seem to be fairly well distributed, but on account of their minute size it is easy to overlook them. They may be looked for on the ledges and cuts in the mountain trails. They are too small to distinguish with the naked eye, so when I find a spot that looks "suspicious" I remove a bit of the earth or rock and take it home for further examination. Out of every ten collections thus made, seven or eight will probably prove to be blanks, while the remaining lot will contain some of these tiny *Cephaloziellas*.

It was my good fortune while at Santa Barbara to discover a fine lot of *Frullania Catalinae* Evans in full fruit. I am told that this is the third station to be reported for this fine species. I found it quite abundant, growing on several oak trees, but not knowing at the time the value of my discovery I neglected to seek further for it. Another species, *Frullania Bolanderi* Aust., I have collected occasionally in the San Gabriel Mountains at an elevation of 4000 feet. It grows on various trees but seems to prefer the live oaks.

No list of hepatics would be complete without mentioning *Marchantia polymorpha* L. One lawn in the center of the city is thickly covered with this plant. Dr. Howe says in his book that he has not seen mature capsules of this hepatic in California, but these Pasadena plants have abundant fruit.

This is not a complete list of Southern California hepatics, but merely a list of those species that I have found here during the past year. There are still several species to be looked for, especially those found in the higher mountains.

In conclusion, I wish to express my thanks to Miss C. C. Haynes, Dr. Evans, and Dr. Conklin, for valuable aid in determining some of the specimens.
Pasadena, California.

THE REDISCOVERY OF *PARMELIA LOPHYREA* ACHARIUS.

BY LINCOLN W. RIDDLE.

[Presented at Sullivant Moss Society Meeting, Minneapolis, Dec. 28, 1910.]

In the autumn of 1908 our indefatigable fellow-member Mr. A. S. Foster, who is doing such keen and discriminating collecting in the northwestern United States, sent me a small package of *Cetrarias* and *Parmelias*. Some time elapsed before I examined the plants. When a study of the material was made, however, a peculiar species of *Parmelia* was found, with characters so distinctive that there was little difficulty in tracing it down to *Parmelia lophyrea* Acharius. The history of this species is of sufficient interest to be recounted here.

Between 1795 and 1800 the English expedition for the exploration of the Pacific, under the command of Vancouver, carried as naturalist the Scottish surgeon, Archibald Menzies. Menzies collected plants along the greater part of our Pacific coast, and his labors were richly rewarded by the discovery of many new species in this interesting region. The lichens of his collection appear to have fallen into the hands of several students, the bulk of them being sent to Acharius, then in the prime of his activities. Among the material was a *Parmelia* which Acharius recognized as new and called by the name indicated above (*Methodus Lichenum* p. 198. 1803). Some years later a portion of Menzies' material was studied by Thomas Taylor, an associate of Sir William Hooker in the publication of the classic "*Muscologia Britannica*" (1828). Evidently Taylor did not know of Acharius' *Parmelia lophyrea* for he called the same plant *Parmelia cribellata* (*Journal of Botany*, p. 641. 1847). We have the authority of Nylander (*Lichenes Scandinaviae* in *Not. Sallsk. Faun. Flor. Fenn.* 5:104. 1861) for the statement that the two names are synonymous. The specimens on which Taylor's name was based are preserved in his herbarium at the Boston Society of Natural History and a comparison of Mr. Foster's material with Menzies' original specimens proves their identity beyond a doubt.

The most interesting point comes in the fact that apparently the species has never been found since the original collection until the recent discovery of the plant by Mr. Foster. In a letter under date of Nov. 16, 1909, Mr. Foster gives the following information in regard to the stations for the species:—" *P. lophyrea* was found in one restricted locality on Point Peterson, north end of the Westport peninsula (Washington), entrance to Gray's Harbor, south side where the northwest winds of summer are always cold; also one other station on the Wishkah River where the moist winds over the water supplied the desirable moisture."

The restricted distribution together with the small size and inconspicuousness of the species undoubtedly accounts for its having been overlooked for over a century. Wellesley College, Wellesley, Mass.

LICHEN NOTES NO. 16

(Containing something of record and comment, and describing one new species.)

G. K. MERRILL.

LECANORA ARGOPHOLIS (Wahl.) Ach. Lich. Univ. p. 306. On rocks of a bluff, Logan, Mont. Dr. J. F. Brenckle. Sufficiently near No. 50 Kryptogamae Exsiccatae, the specimen yet has the thicker thallus characteristic of *L. frustulosa* (Dicks.) Ach. Tuckerman included the *L. argopholis* of Nyl. Scand. p. 166 in his conception of *L. frustulosa*, and in Koerb. Systema the form is made var. a. or equivalent to the species. Nylander gives the spore dimensions of *L. argopholis* as $11-18 \times 7-9\mu$ as compared with $10-12 \times 6\mu$ for *L. frustulosa*, and indicates for the species larger apothecia than those of the latter. I do not find that any of the authorities described *L. argopholis* as with an effigurate thallus such as *L. frustulosa* often possesses. Such differences as are here mentioned seem scarcely sufficient to separate the two forms.

RAMALINA POLLINARIA Ach. L. U. p. 608. On dead trunks, near Waynesville. N. C. Paul C. Standley, No. 5813. This plant is the nearest approach to the *R. pollinaria* of Europe of any yet examined from America. The tips of the laciniae show the farinose soredia characteristic of the species, but in all other particulars the specimen might be passed as *R. farinacea*.

RAMALINA CERUCHIS (Ach.) DN. Frammenti lich. p. 45. On willows, Kanaka Bay, San Juan Island, Wash., A. S. Foster. Provided with apothecia, but no spores were discovered. Interesting because of establishing a new northerly limit for the species on the West Coast.

ALECTORIA IMPLEXA (Hoffm.) Nyl. ex Norrl. Med. Soc. pro F. et Fl. Fenn. I, (1876) p. 14. Reaction KHO + yellow. On trees, Gaspé peninsula, Quebec, Skagway, Alaska, and Nova Scotia, J. Macoun; near Spokane, Wash., T. A. Bonser. This is in part var. c. *implexa* Fr. of Tuckerman's Synopsis, the other components being *A. jubata* (L.) Ach. Nyl. emend. Cromb. Jour. Bot. 1872, p. 233. best represented in this country by the sorediiferous West Coast specimens that Acharius distinguished as the var. *prolixa*, and the filiform esorediate condition from Eastern America. This last mentioned plant is intermediate between *A. jubata* (L.) Nyl. and the var. *lanestrus* Ach. L. U. p. 593, and like both is without proper reaction with KHO. The plant is distinct and deserving of a name, and it is proposed to designate it as ***A. jubata* forma *minuscula*** forma nov. The examples of *A. jubata* and its variations known to the writer may be arranged as follows:

A. jubata (L.) Ach. l.c. commonly elongated, pendulous and sorediate.

forma *minuscula*, commonly abbreviated but pendulous filiform throughout and esorediate.

var. *lanestris* Ach. Lich. Univ. p. 593, much reduced, erect or prostrate, sparsely sorediate or destitute.

var. *nitidula* Th. Fr. Scand. p. 25, short, erect, shining and esorediate.

ALECTORIA CHALYBEIFORMIS (L.) Nyl. Flora 1869 p. 445, forma **nidulifera** (Norrl.) Merrill comb. nov. *A. nidulifera* Norrl. Flora 1875, p. 8. On dead trunks, vicinity of Waynesville, N. C. P. C. Standley, No. 5779. Mixed with normal conditions of the species. The form has been identified in collections from Montmorency Falls, Quebec, J. Macoun; Hendersonville, N. C., H. A. Green; and Knox County, Maine, the writer,

ALECTORIA LOXENSIS (Fée) Nyl. Syn. p. 278. On trees, base of Blue Mountain Peak, Island of Jamaica, Wm. T. Maxon, No. 1449. Perfectly characteristic but without apothecia. Specimens from Neocria, Mexico, collected by C. G. Pringle have lateral concave apothecia with thin elevated entire margins, the spores parenchymatous, brown, $84-105 \mu \times 38-45 \mu$.

PARMELIA ULOPHYLLA (Ach.) Merrill, Bryologist 11:91. On oak trunks near Waynesville, N. C. P. C. Standley. Exactly agreeing with the plant from Manitoba House, J. Macoun, on which the species was constituted. There is every reason to believe that the plant may be found anywhere in our Northern States, but is overlooked from its resemblance to *P. caperata*.

PARMELIA CETRATA Ach., Hue emend. Lich. Ex. Eur. p. 173 *P. reticulata* Tayl. in greater part; *P. perforata* of Nylander's various publications for the most part. Forma *ciliosa* Olivier Viaud-Grand-Maraîs, Notes sur les Parm. et les Physc. de l' Ouest (France) p. 156. On trunks, near Waynesville, N. C. P. C. Standley, No. 5784. The specimens are both limbate and globose-sorediate, and the margins markedly black-ciliate. Not previously recorded for America so far as known. The form also occurs in Knox County, Maine.

P. cetrata forma *sorediifera* Wainio Etud. Bresil, p. 40 has been examined from various localities in Ohio, Pennsylvania and Maryland, but in no instance were the specimens correctly identified by their distributors. *P. cetrata* var. *corniculata* Mull. Arg. Rev. Lich. Meyen, p. 312 is detected from Georgesville, Ohio. E. E. Bogue.

PARMELIA PERFORATA Ach. Method, p. 217. It is now well known that Nylander mistakenly conceived the plant at present recognized as *P. cetrata* Ach. to be the *P. perforata* of Acharius, and the error made easily possible the establishment of the very distinct and true *P. perforata* as a species with the name of *P. hypo-*

tropa. But *P. perforata* and *P. hypotropa* are absolutely identical, proved in numberless specimens that present the characters of both in an individual plant. To certain specimens of so-called *P. hypotropa* coming from the Gulf States, entirely white beneath, the name of *hypotropa* might be applied, but in no other sense than that of merely a state or form as in Tuckerman's view.

NEPHROMA LUSITANICUM Schaer. Enum. p. 323. Overmosses at the base of trees, South Thomaston, Maine, Sept. 1909, and detected in material from Nova Scotia, collected by Prof. J. Macoun. Previously unrecorded from Eastern America so far as I know.

LECANORA SUBTARTAREA Nyl. Flora 1882, p. 550. On trunks of spruces and once on birch, Knox County, Maine, and on spruce, Nova Scotia, Prof. J. Macoun. Reaction KHO+yellow, with CaCl the varioloid outgrowth is tinged reddish. A peculiar plant easily to be taken for a *Pertusaria*. Our specimens are all without apothecia, but comparison with authentic material makes the determination certain. Unrecorded from America so far as I know.

Leptogium (*Mallotium*) **pilosellum** Merrill sp. nov. Thallus irregularly orbicular, moderately expanded, appressed centrally but somewhat free and slightly undulate toward the circumference, membranaceous, brownish-green when dry but blackish-green wet, sub-monophyllous, irregularly lobate at the circumference, the axils acute, the margins of the lobes smooth or minutely notched and interruptedly white-pilose, cortex here and there smooth but mostly scabrous, beneath colored much as above and interruptedly hirsute with simple white rhizoids 1-5 mm in length. Apothecia small, plane, reddish or brownish, the thalline margin more or less densely white-pilose. Spores fusiform-ellipsoid, bilocular, each sporoblast one or more nucleolate, $20-24 \times 7-8\mu$. Paraphyses articulated, rather discrete. Algae blue-green, in clusters, no distinct chains observed. On mosses over rocks, Goldendale, Wash. A. S. Foster, No. 1186. Rockland, Maine.

REVIEWS, CURRENT LITERATURE.

EXOTIC MOSSES.

C. Heinrich of Dresden has just issued the first part of Dr. Georg Roth's "Die Ausseureuropäischen Laubmoose," including *Andreaeaceae* with seven plates and beginning the *Archidiaceae* including the generic description and the key. This is the beginning of a stupendous undertaking, no less a task than figuring and describing, as far as possible from original or type specimens, all the mosses of the World, other than those that occur in Europe. It promises well for the success of this undertaking, that he has secured the coöperation and loan of material from Messrs. Brotherus and Cardot, Levier, and others, and

that he has seen original specimens from Müller's Herbarium at Berlin and from the Lorenz Herbarium at Dresden, through the favor of Dr. Karl Schliephacke, the Director. Some of the types have been loaned from Kew and from the K. K. Nat. Hist. Hof. Museum at Vienna; the Melbourne Museum also has contributed some species.

There are 102 species of *Andreaea* described, which with the 15 European species already enumerated in "Die Europäischen Laubmoose," bring the total number up to 117 as against 105 listed by Brotherus in E. & P. Pflanzenfam. and 89 by Paris Index. Of these 102 species he states that all but 13 have been described and figured from the original specimens and there are three sets of original sketches by Robert Brown in the text! This is a remarkable record for the first part and shows a helpful and generous disposition among the Bryologists which is encouraging for future work. We can heartily commend the descriptions and typography which is clear and well-spaced but cannot enthusiastically praise the drawings, which seem obscured by too much stippling and pretence at cellular detail. It would have been better to omit all unnecessary shading and simply give a few cells, *accurately drawn*, from three parts of the leaf.

E. G. B.

DIE MOOSE DES SAREKGEBIRGES.

By H. W. ARNELL (Upsala) and C. JENSEN (Hvalso, Danemark).

The second and third parts of the Natural History Survey of the Sarekgebirges of Swedish-Lapland containing the mosses have just been received. They contain 268 pages and 260 species with index and supplement with ecological tables by C. Jensen. The sequence of families adopted and the nomenclature are mainly those previously used by Lindberg in his *Musci Scandinavici*, and not that of recent authors, nor do they follow the recommendation of the Brussels Congress; parenthetical citations of Linnaeus and Swartz are used, and *Georgia*, *Schistophyllum*, *Astrophyllum*, *Sphaerocephalus*, *Pohlia*, *Webera*, *Leersia*, *Mollia*, *Swartzia*, *Ditrichum*, *Oncophorus*, *Saelania*, *Weissia*, *Dorcadion*, *Anoetangium* and *Fissidens* are used in their original and primitive sense. *Grimmia* includes *Rhacomitrium*, *Amblystegium* and several of the aquatic Hypnaceous genera usually considered distinct. *Hypnum* also is much more comprehensive than modern authors now treat it, and takes the original Dillenian sense, being used for *Brachythecium*, *Eurhynchium* and *Camptothecium*. Some changes to the oldest specific names are also notable. A few figures in the text illustrate new species or varieties, and in many cases the associated species are indicated. Taken as a whole this is a most interesting addition to the literature of mosses.

ELIZABETH G. BRITTON,
N. Y. Botanical Garden.

REVIEW OF THE BRYOTHECA FENNICA OF DR. V. F. BROTHERUS

L. W. RIDDLE

The close relationship of the moss-flora of Scandinavia, Lapland, and Finland to our North American flora makes the set of mosses which Dr. Brotherus is issuing under the title of "Bryotheca Fennica" of special importance to students of our mosses. Of the 100 species recently issued in the first fascicle, 88 are species found in North America. As we should expect, many of these, such as *Distichium capillaceum* (Sw.) B. & S. *Dichodontium pellucidum* (L.) Schimp., *Dicranum Blytii* Schimp., *Amphidium lapponicum* (Hedw.) Schimp., and *Zygodon viridissimus* (Dicks.) R. Br., are arctic-alpine species. But an interesting point in distribution is illustrated by the fact that 13 out of the 88 occur with us only in the Rocky Mts., or on the Pacific Coast. Among the many interesting things included are a series of 12 numbers of *Dicranum* and 7 numbers of the polymorphic group of *Drepanocladus*; while the peculiar *Splachnaceae* are represented by *Splachnum ampullaceum*, *sphaericum*, and *luteum*, *Tayloria lingulata* (*Dissodon splachnoides* of Lesquereux & James' Manual) and *Tetraplodon mnioides*.

In the excellence and abundance of the material and the form of the set, Dr. Brotherus establishes a high standard of merit; all the more noteworthy when we take into consideration the low price (\$6.00 per fascicle) at which the set is being issued. It is understood that the second fascicle will appear during the Spring of 1911, and that Dr. Brotherus would be glad of a few more American subscribers.

Wellesley College, Wellesley, Mass.

PRIZES FOR MOSS PHOTOGRAPHS

The Editor needs some good photographs of our common mosses and to induce members of the S. M. S., to help him offers three prizes for the best submitted. 1st. A copy of Mosses with Hand-lens and Microscope in half leather (or \$5 cash if preferred). 2nd. The same in cloth, (or \$4.) 3rd. A year's membership in the S. M. S. Characteristic appearance, clearness and abundance of detail, and artistic arrangement of form and of light and shade will be the principal factors upon which the award will be made. Prints must be on glossy paper suitable for half-tone reproduction. The right is reserved to declare no reward and return all photographs received if none of sufficient merit is submitted. The prize winning photographs will be published in the *Bryologist* but the prints and negatives will become the property of the Editor, who pays the prizes personally. All the prints submitted become the property of the Editor, but if used a copy of Mosses with a Hand-lens will be sent in exchange. Entries close Oct. 1st, 1911.

EXCHANGE DEPARTMENT

(To Society Members only. For postage, send a self addressed envelop and do not forget the stamp.)

Mrs. B. J. Handy, 139 Rock Street, Fall River, Mass. *Plagiothecium striatellum* (Brid.) Lindb. cfr; *Hypnum Schreberi* Willd. cfr. Coll. Mass.

Mr. George B. Kaiser, 524 Locust Ave., Germantown, Pa. *Drummondia clavellata* Hook.; *Ulota Americana* (Beauv.) Lindb.; *Andreaea Rothii* W. & M. Coll. in New York.

Mr. D. Lewis Dutton, Brandon, Vermont. *Cladonia verticellata* Hoffm.; *C. turgida* (Ehrh.) Hoffm.; *C. crispata* (Ach.) Flot. *Sphagnum Wulfianum* Girg. All collected in Vermont.

Dr. H. S. Jewett, 15 W. Monument Ave., Dayton, Ohio. *Gymnostomum curvirostre* (Ehrh.) Hedw., also the var. *scabrum* Lindb. of the same. Both from near Dayton.

Prof. S. M. Newman, Hagerstown, Md., *Ptilidium pulcherrimum* (Web.) Hampe, from the Adirondacks, N. Y.

Mrs. Elizabeth M. Dunham, 53 Maple Street, Auburndale, Mass. *Ptilidium ciliare* (L.) Nees; *Dicranum majus* Smith, var. *orthophyllum* A. Br. both coll. New Brunswick. Mr. Edward B. Chamberlain kindly determined the *Dicranum* offered, and wrote "In Milde's Bryologia Silesiaca p. 71 the following is given under *Dicranum majus* var. *orthophyllum* A. Br. 'Leaves at the ends of the branches feebly secund, almost erect.' Warnstorf in Kryptogamenflora der Mark Brandenburg 2: 134 has, 'var. *orthophyllum* A. Br. is a form either with the stem leaves faintly secund and the tufted leaves at the ends of the stems erect, or with the leaves all erect.'"—E. M. D.

SULLIVANT MOSS SOCIETY NOTES.

Our member, Mr. Egidio Corti, 67 Corso Magenta, Milan, Italy, desires to exchange species of northern Italian mosses for those from North America.

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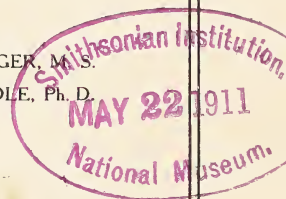
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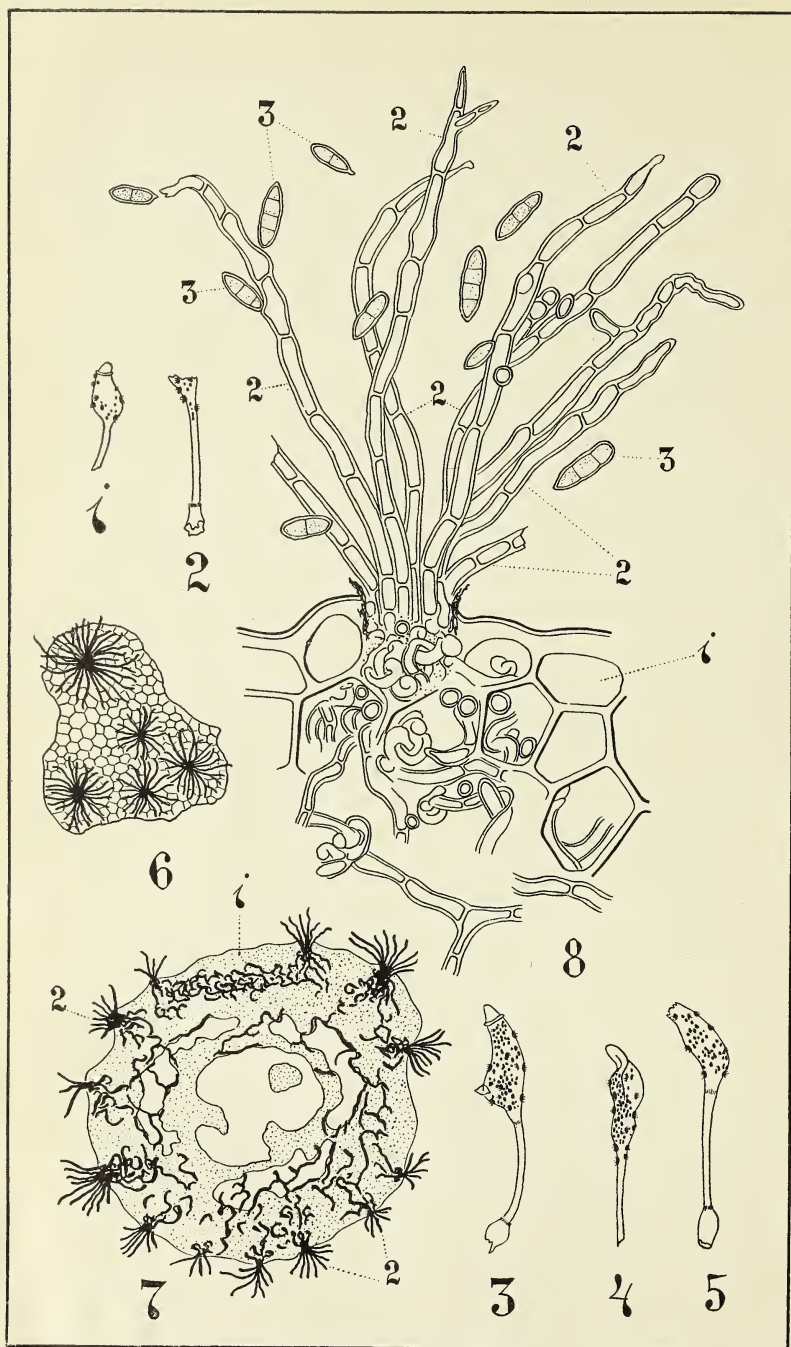


PLATE VI.

THE BRYOLOGIST

VOL. XIV

MAY 1911

No. 3

NOVITAS CRYOLOGICA.

Auctore : István Györfy, (Löcse, Hungary).

Cladosporium herbarum in *Buxbaumia viridi* parasitum.

In Hungaria septentrionali, ad pedum montis Magas-Tátra (Tatra Magna) legi¹⁾ ipse exemplaria *Buxbaumiae viridis* Brid.,²⁾ talia, in quarum—praecipue capsularum superficie punctula atra majora et minora, et iam amplificatione minima, e punctulis atris fila subtilia exstantia videri possunt (vide Tab. VI, fig. 1-5). Horum punctulorum auctorem esse—sicut mihi illustrissimus ac doctissimus dominus, mycetum scrutator diligentissimus, Prof Dr. L. Hollós (Kecskemét) scripsit in litt. ad me—*Cladosporium herbarum* (Pers.) Link., qui fungus plantarum innumerabilium parasita est.³⁾

Cladosporium herbarum in intimis capsulis rete densum mycelii, et in externis scopas minutulas numerosasque, uti dicitur, hyphas (vide Tab. VI, fig. 7²⁾) format. Hyphae a summo spectatae in stellae figuras redactae sunt (Tab. VI, fig. 6). In sectione transversa capsulae et microscopio scrutatae hyphae septatae, fumoso-fuscae, apicibus pallidiores et raro superne divisae (Tab. VI, fig. 8²⁾); conidia 1-4-septata, longe elliptica, hyalina, utrinque seu apice una mucronata sunt (Tab. VI, fig. 8³⁾).

Mensuram partium singularium plantae Tatraënsis in conspectum dat tabella sequens.

	Latitudo.	Longitudo.
Conidia ex una cellula composita e duabus cellulis	5μ-8μ-9μ	13μ-16μ-19μ
	5μ-8μ	*10μ-13μ-16μ - 19μ-21μ
e tribus cellulis	8μ-9μ	21μ-24μ-27μ - *32μ
e quattuor cellulis	8μ-9μ	18μ-21μ-24μ - 27μ-30μ
Hyphae	4μ-5μ-7μ-*8μ	*136μ-170μ-204μ 221μ-255μ-272μ *340μ
Cum asteribus () numerorum notati sunt rari casus.		

1). In tractu Barlangligst, ad viam "Ivanka-ut" in truncis putridis *Piceae excelsae* 776 m. supra mare, 1910, 29\vi, et in tractu Lersch-villa, eodem substrato, 780 m. s. m., 1907. 8\vi, 1910, 11\vi.

2). Syn. *Buxbaumia indusiata*, Brid.

3). Cf. Rabenhorst: Krypt. Fl. Bd. I.; Abt. viii: 802.

The March Bryologist was issued March 11, 1911.

The January Bryologist was issued Jan. 14, 1911.

E mensura apparet, plantam nostram *Cladosporio epibryo* Cooke & Massee¹⁾ identificam dici non posse, quia inter eas e diagnosi²⁾ magnae differentiae inveniuntur Quo in musco *Cladosporium epibryum* vegetat, nescio, quia *Cooke* loco citato ephemeridis "*Grevillea*" solum his expressis verbis de habitatione hujus fungi mentionem facit: "On capsules of various mosses. United States. (Mrs. E. G. Britton.)"

Bryophyton scrutatrix celeberrima, omnibus nota, Mrs. Elizabeth Gertrude Britton, in ephemeride hac de specibus diversis ("of various mosses") gratissimum et doctissimum responsum dare posset.

In litteratura mentio de *Cladosporio herbarum* in capsulis *Buxbaumiae viridis* parasito non facta est. Gratias hic optimas ago ill. ac cl. domino Dr. L. Hollós pro auxilio in determinatione.

EXPLICATIO TABULAE VI.

Fig. 1-5: Exemplaria *Buxbaumiae viridis* diversa *Cladosporio herbarum* obiecta, $\times 2$.

Fig. 6. Hyphae a summo spectatae in stellae figuras redactae, $\times 16$.

Fig. 7. Sectio transversa partis inferioribus capsulae; 1), pars cum punctulis delineata demonstrat cellulas capsulae adumbratim: mycelia et hyphas (2) lineis crassis depinxi. $\times 16$.

Fig. 8. Sectio transversa partis unius parvae e capsula: 1) cellulae epidermidis seu epicarpi, in quibus mycelia densum rete formant; 2) hyphae; 3) conidia. $\times 215$.

ENGLISH ABSTRACT BY EDWARD B. CHAMBERLAIN

I have collected at the foot of the Magas-Tátra Mts. in Northern Hungary, certain specimens of *Buxbaumia viridis* Brid., which have dark spots of greater or less size upon the surface of the capsules. From these spots proceed wavy threads. According to a letter of Dr. Ladislaus Hollós of Kecskemét, these spots are caused by a fungus, *Cladosporium herbarum* (Pers.) Link., which is parasitic upon many plants,

Cladosporium herbarum forms a dense network of mycelium inside the capsule and on its surface minute threads, the hyphae. The latter viewed from above are seen to spread out in a star-like mass. The appended table gives the measurements of the various parts in microns.

Judging from the diagnosis in *Grevillea*, and from the measurements, our plant is not identical with *Cladosporium epibryum* Cook &

1). M. C. Cooke: Some Exotic Fungi. *Grevillea*, **17**: 76. 1889.

2.) "Caespitulis minutissimis, atris. Hyphis simplicibus, brevibus, flexuosis, septatis, olivaceis, superne pallidioribus; conidiis ellipticis, utrinque rotundatis, uniseptatis, medio constrictis, pallide fuscis, hyalinis, 18-20 \times 10-12 μ . On capsules of various mosses. United States. MRS. E. G. BRITTON."

Cf. Saccardo: Sylloge Fungorum. **10**: 605. 1892. No. 26.

Massee. I do not know upon what species of mosses *Cladosporium epibryum* grows, since Cooke (l. c.) gives only the habitat, "on various mosses, United States, (Mrs. E. G. Britton)". Mrs. Britton might make a very welcome note in the BRYOLOGIST concerning these species. No mention is made in literature concerning the occurrence of *Cladosporium herbarum* upon *Buxbaumia viridis*. I wish to express my most sincere thanks to Dr. Hollós for aid in the determinations.

REVIEW OF DISMIER'S REVISION OF PHILONOTIS

ELIZABETH G. BRITTON.

The Revision of the genus *Philonotis* of America by Monsieur Gabriel Dismier* following on his revision** of the European species of this genus, will be studied with much interest by many American students. This contribution enumerates 20 species and subspecies, of which 15 are North American, and only 11 South American. Paris Index lists 52, and Brotherus states that there are 74 in America, of which 67 are endemic, and 23 are credited to North America; eleven of these are not mentioned by M. Dismier, but there is not as great a discrepancy in the number of species as would appear, for forty names, both printed and manuscript, are reduced to synonyms. He states in the preface that there have been too many species described, and many of them on specimens without any value. He instances the confusion created by C. Müller by his lack of moderation, and reduces 16 of his names to synonyms, besides 24 of the fourteen of other authors. The most notable North American reductions are those of *P. Muehlenbergii* (Schwaegr.) Brid. to *P. marchica* (Willd.) Brid., and *P. Macounii* L. & J. to *P. cavillaris* Lindb. Two new subspecies are described, *Philonotis americana* Dismier under *P. seriata* (Mitt.) Lindb. which appears to be quite common in the United States and British America; and *P. fallax* Dismier under *P. caespitosa* Wils. from seven stations in the United States and Canada. There are also seven new varieties recognized, five additional ones to our flora; some of these are founded on mere differences in size and could be included in a comprehensive specific description. The geographical distribution of the species is as follows: Arctic America 1; United States and Canada 7; United States and Central America 1; Central America, endemic 1; United States, West Indies and South America 2; West Indies and South America 1; South America 11; cosmopolitan 1, *P. fontana*.

The most interesting extensions of range are the occurrence of *P. gracillima* Aöngstr. in Texas, of *P. sphaerocarpa* in Florida and of *P. tenella* and its varieties in Louisiana and Florida. The following North

* Bull. Soc. Bot. de France 10. Memoires 17:17-37. Dec. 1910.

** Mem. Soc. Nat. des Sci. Cherb. pp. 367-428, 1908.

American species listed by Brotherus and Paris Index are not cited: *P. acutiflora* Kindb., Victoria, Vancouver Island; *P. amblyoblasta* (C. M.) Jaeg., Mexico; *P. Bernoullii* (C. M.) Par., Guatemala; *P. Berteroana* (C. M.) Besch., Trinidad; *P. glabriuscula* Kindb., Canada; *P. graminicola* (C. M.) Jaeg., Mexico; *P. Hansenii* (C. M.) Par., Jamaica, Kingston; *P. ligulata* (C. M.) Par., Porto Rico; *P. pumila* Kindb., Canada; *P. salvadorica* C. M., Honduras; *P. subsphaerocarpa* Broth., Martinique.

Monsieur Dismier states that *P. calcarea* has not yet been found in North America and all the specimens, so-called, are referable to *P. fontana*, but in a recent letter he decided that a specimen from the Mitten Herbarium collected by Lieber in Martinique appears to be correctly so named. He also says that he feels greatly the deficiencies of the Revision and proposes to continue his studies. He has established the fact that two species from the southern United States range through the West Indies to South America, but one point in nomenclature which hinges on this distribution, Monsieur Dismier has failed to grasp, and that is, that *Bartramia glaucescens* Hsch. (1840) antedates *B. tenella* C. M. (1849) and that it should therefore be known as *P. glaucescens* (Hsch.) Paris. He also has failed to take up another older specific name, for *B. longiseta* (Michx. flor. bor. Am. 2: 301. 1803) antedates *B. radicalis* P. B. (1805) and it should therefore become **Philonotis longiseta** (Michx.) E. G. B. new comb.

New York Botanical Garden.

REVISION OF THE AMERICAN SPECIES OF PHILONOTIS.

G. DISMIER.

Translation by E. B. Chamberlain.

[In the following translation of M. Dismier's Revision des Philonotis de l'Amérique I have limited myself to those species and varieties which are found in the United States and Canada, save that the Key to the Species is given in full. On account of the difficulty of obtaining descriptions of the species in the sense adopted by M. Dismier, I have added short descriptive notes for nearly all the species, as well as references to plates and a few additional synonyms. In each case the source of this description is given, in nearly all cases M. Dismier's "Essai Monographique sur les Philonotis de France," published in the Mémoires de la Société nationale des Sciences naturelles et mathématiques de Cherbourg, Vol. 36, pages 367 to 428. (1908).

I wish to express my thanks to Mrs. E. G. Britton, Rev. H. Dupret, and especially to M. Dismier for the kind assistance that has been given me in this work.—E. B. C.]

KEY TO THE AMERICAN SPECIES OF PHILONOTIS.

Leaves not margined.

Dioicous or autoicous, male flowers gemmiform... *Philonotula*.

Dioicous, male flowers discoid.

Leaf-cells uniformly quadrate, with papillae over the center of the lumen..... *Catenularia*.

Leaf-cells elongated, with papillae at the end of the lumen..... *Eu-Philonotis*.

Leaves margined..... *Pseudo-Mniobryum*.

Section I.—PHILONOTULA. *Bry. Eur. fas. 12: 21. (1842)*, as subgenus of *Bartramia*.

Autoicous species.

Plant 2-3 cm. high, usually without subverticillate branches below inflorescence; seta 3-4 cm., long; North American..... *P. radicalis*.

Plant not over 2 cm. high, with 4-5 subverticillate branches below inflorescence; seta short; South American... *P. curvata*.

Dioicous species.

Leaves obtuse; costa ceasing below apex..... *P. gracillima*.

Leaves acute.

Plants small.

2-3 cm. high; leaves rather broad..... *P. sphaerocarpa*.

1-2 cm. high, leaves narrow..... *P. tenella*.

Stems stiff; leaves closely appressed when dry... *P. rufiflora*.

Stems slender, leaves in regular rows; innovations numerous, filiform; capsules small..... *P. elegantula*.

Leaves secund; capsules small..... *P. Moritziana*.

Leaves shining, patent, distant..... *P. chrysoblasta*.

Plants rather tall.

Stems hooked at the summit; leaves secund, closely set; costa not very strong..... *P. uncinata*.

Stems flexuous; leaves more distant; costa very strong..... *P. crassinervia*.

Section II.—CATENULARIA Muell., *Flora. 1885. 411.* as section of *Bartramia*..... *P. scabrifolia*.

Section III.—EU-PHILONOTIS Limpr., *Laubm. 2: 557. (1893)*.

North American species.

Leaves sharply toothed all around; papillae over upper end of lumen.

Plants 1-2 cm. high: stem leaves oblong lanceolate, plane or slightly concave..... *P. capillaris*.

Plants 3 cm. high; stem leaves long triangular, slightly concave and carinate..... *P. marchica*.

Leaves with paired teeth, at least at base; papillae over the lower portion of the lumen, or sometimes over the middle.

Leaves in regular rows.

Rows spiral; leaves obtuse, costa very stout, red-papillate *P. seriata*.

Rows not spiral; stem-leaves acute, very concave; costa more or less excurrent *P. americana*.

Leaves not in regular rows.

Leaves wholly plane *P. caespitosa*.

Leaves revolute.

Plants of medium height.

Stems slender; stem leaves erect, patent at tip, oblong lanceolate, revolute nearly to apex; costa slender, long piliform-excurrent *P. tomentella*.

Stems stouter; stem leaves falcate-secund, narrowly lanceolate, revolute to middle, very long acuminate; costa slender, excurrent *P. fallax*.

Plants large, stem leaves plicate at base, broadly oblong, acuminate; costa strong, more or less excurrent *P. fontana*.

South American species.

Stems easily separating, simple; leaves secund, oblong; costa mucronate-excurrent *P. parallela*.

Stems coherent.

Costa stout, percurrent *P. pellucidiretis*.

Costa medium size, more or less excurrent.

Leaves oblong lanceolate, concave, plicate, long acuminate *P. fontanella*.

Leaves narrowly lanceolate, plane, not plicate; costa mucronate-excurrent *P. elegantissima*.

Section IV.—PSEUDO-MNIOBRYUM. Broth., *Natuer. Pflanzenf.* I.3: 652. (1904) *P. vagans*.

1. PHILONOTIS RADICALIS (Beauv.) Brid., *Bryol. Univ.* 2: 17. (1827).

Bartramia radicalis Beauv., *Prodr.* 44. (1805).

Lesq. & James, *Manual.* 206. (1884).

Sulliv., *Icones Musc.* 85. t. 52. (1864).

Ph. orizabana. Schimp. mss. Besch., *Prodr. Bryol. Mex.* 58. (1871).

A species of the eastern coast of the United States and Mexico*; ranging from New York to the Gulf, west to Kansas.

*Brotherus, in *Natuer. Pflanzenf.* I.3: 646, reports this species from Corea.

2. PHILONOTIS GRACILLIMA Aongstr., *Oefv. Kgl. Vet.-Akaa Foerh.* **33**: 17. (1876).

Tufts small, stems slender; leaves erecto-patent, oblong lanceolate, nearly plane, obtusely serrulate, obtuse, with lax, hyaline areolation; costa ceasing below the apex. (*Aongstr. l. c.*)

Range: Southwest Texas: Jamaica and the lesser Antilles to Bolivia and Brazil.

3. PHILONOTIS SPHAEROCARPA (Swartz) Brid., *Bryol. Univ.* **2**: 25. (1827).

Mnium sphaericarpum Swartz, *Prodr.* 139. (1788); Hedw., *Musc. Frond.* **3**: 93.t.38, A. (1792).

Bryum sphaericarpum Swartz, *Fl. Ind. occ.* **3**: 1835. (1806).

Stems erect, tomentose; fasciculately branched; leaves imbricate, patent, lanceolate-acuminate, cuspidate, denticulate, with lax, quadrate areolation, papillose on the back; capsule long-pedicelled, globose.—(*Muell., Syn. Musc.* **1**: 481.)

Range:—South Florida: West Indies and Central America to Brazil and Peru.

4. *PHILONOTIS TENELLA (Muell.) Jaeg. *Adumb.* **1**: 541. (1873-4).

Ph. Muehlenbergii var. *tenella* Brid., *Bryol. Univ.* **2**: 23. (1827).

Lesq. & James, *Manual.* 208. (1884.)

Bartramia tenella C. Muell., *Syn. Musc.* **1**: 481. (1849.)

Bartramia glaucescens Hornsch., *Fl. Brasil.* **1**: 40. (1840).

Philonotis glaucescens (Hsch.) Paris, *Ind. Bryol. Ed.* 1. 923. (1885). (*)

Very small, tomentose, with recurved branches near the apex of the stems; leaves densely arranged, lanceolate, subsecund, acutish, obscurely denticulate, remotely papillose on the back; areolation minute and lax; capsule long-pedicelled, more oblong than in *Ph. sphaerocarpa*.—(*C. Muell., l. c.*)

Range:—Southern Louisiana; throughout the Antilles and Central America to Brazil and Chile.

var. TERRESTRIS Dismier.

In dense turfs, stems very short (3-5 mm.)

Range:—South Florida, Porto Rico, Guadeloupe, Brazil, Paraguay.

5. PHILONOTIS MARCHICA (Willd.) Brid., *Bryol. Univ.* **2**: 23. (1827).

Bartramia marchica Brid., *Mant. Musc.* 116. (1819).

Bry. Eur. Monog. 17, t.8. (1842).

B. Muehlenbergii Schwaegr., *Supp. I.* **2**. 58. t.61. (1816).

Philonotis Muehlenbergii (Schwaegr.) Brid., *l. c.* 22.

Lesq. & James, *Manual.* 208. (1884).

A species that is often confused with others of the genus, yet readily separated by the following characters:—Leaves shaped like

*For more extended synonymy, see the original article.

an elongate isosceles triangle with curved borders, carinate; teeth acute, never in pairs; papillae always over the upper end of the cells. Range:—New Brunswick and Ontario, south to Texas, west to Minnesota.

6. PHILONOTIS SERIATA (Mitt.) Lindb., *Musc. Scand.* 15. (1879).

Dixon & Jameson, *Handbook*. Ed.ii: 324. t. 41. B. (1904).

Bartramia seriata Mitt., *Musci Indiae orient.* 63. (1859.)

Tufts loose; stem leaves in *regular spiral rows*, oval-lanceolate, falcate, acuminate, obtuse, carinate, somewhat decurrent, concave and plicate, marginal teeth in pairs; costa strong, *red, highly papillose at back*; perigonal leaves, oval, *rounded at apex, obscurely costate*.—(*Essai*, 417.)

A rare species in America, the only specimens seen coming from Greenland. Most specimens so named are referable to the next subspecies.

7. *PHILONOTIS AMERICANA Dismier.

Ph. fontana var. *serrata* et *brachyphylla* Kindb., *Catl. Canadian Pl.* Pt. 6: 107. (1892), (*nom. nud.*)

Dioicous; in more or less dense cushions, yellowish green or rarely deep green, interwoven with brown tomentum below; stems 6-7 cm. high. Stem leaves 2.5×0.9 mm., appressed and arranged in regular rows, *oval or oblong-oval*, rather shortly acuminate, very concave, carinate, with 1-2 plicae on each side of the costa; margins revolute below, the teeth in pairs even in the upper portion; costa well developed, yellowish, orange, or brown, at times papillose on the back, usually somewhat excurrent; areolation of the rectangular cells laxer toward the base with papillae at the lower angles. Male inflorescence large; perigonal bracts erecto-patent, or horizontal, oval, strongly concave, rounded or acute at apex, costa obscure. Seta 4 cm. long, dark red, flexuose. Capsule oval-arctuate, 3×2 mm., brown, strongly sulcate when dry; operculum conical, obtuse; stomata numerous in the collum. Teeth of peristome brown, lanceolate, 0.4×0.08 mm., of about 25 articulations, with *tori* in the upper third. Endostome yellowish, papillose, basal membrane 0.18 mm. high with the processes equalling the teeth, open along the keel, cilia 3. Spores 20μ in diameter, globose or reniform, yellowish, verrucose.

Range:—Aleutian Islands, British Columbia and Newfoundland, south to Utah, Wisconsin and New York.

var. TORQUATA (Ren. & Geh.) Dismier.

Ph. Macounii var. *torquata* Ren. & Geh., *Rev. Bry.* 23: 61. (1896).

Leaves large, spirally twisted when dry, very concave and deeply plicate near the nerve.—Washington. — (*Rev. Bry.* l. c.)

var. GRACILESCENS Dismier.

Tufts dense, green, with long slender stems, and small short leaves.
Gaspé Co., Quebec.

An extremely variable species, especially in gross appearance. The leaves may be short and abruptly acuminate, or oblong-lanceolate and gradually acuminate with a long excurrent costa. While approaching *Ph. seriata* the present species differs in the arrangement of the leaves and the shape of their apex. *Ph. glabriuscula* Kindb., *Catl. Canadian Pl.* Pt. 6: 107, belongs here according to some examples of No. 578, *Canadian Musci*, but specimens from the original locality distributed by Mr. J. Moser are *Ph. caespitosa*.

8. PHILONOTIS FONTANA Brid., *Bryol. Univ.* **2**: 18. (1827).

Lesq. & James, *Manual.* 209. (1884).

Dixon & Jameson, *Handbook.* Ed. 2: 321. t. 40. J.
(1904). (excl. varr.)

Bartramia fontana Brid., *Mant. musc.* 116. (1819).

Bry. Eur. Monog. 18, t. 9. (1842).

In dense tufts, stems erect, with subverticillate branches; stem leaves erect, more or less imbricate, slightly second, concave, oval or cordiform-lanceolate, slenderly acuminate, strongly revolute to middle, 1-2 plicate, teeth of margin in pairs; costa strong, broader at the base, more or less excurrent; areolation rectangular or rhomboidal, papillae in the lower angles; perigonal leaves oval triangular, the inner obtuse.—(*Essai.* 403.)

Range:—Throughout North America, extending into Mexico.

Polymorphous: like many mosses of similar habitat. The specimens in Sull. & Lesq. *Musci Boreali-Americani* Nos. 165 & 250, distributed as *Ph. calcarea*, are without any doubt *Ph. fontana*. Up to the present no specimens of *Ph. calcarea* are known from America.

var. HETEROPHYLLA Card & Thér. *Univ. Cal. Publ. (Bot.)*
2: 300. (1906).

Leaves dimorphous, the lower normal, the upper short, imbricate scarcely revolute, laxly areolate with short cells. Perigonal leaves distinctly costate to apex, obtuse or acute in the same involucre.—(*Card. & Ther., l. c.*)

Range:—Alaska, Aleutian Islands, Selkirk Mts., Montana, Maine.

9. PHILONOTIS TOMENTELLA Mol. *emend. Loeske, Hedw.* **45**:
203. (1906).

Roth, *Eur. Laubm.* **2**: 239. t. 26 f. (1904).

Ph. alpicola Jur. in sched. Lorentz, *Moosst.* 170. (1864).

Ph. microcarpa Kindb., *Rev. Bryol.* **32**: 37. (1905).

Tufts more or less dense, radiculose; stems erect, 6-10 cm. high, simple or with verticillate branches. Leaves of two alternating

forms:—(1). leaves 1.2×0.8 mm, imbricate or patent at the tip, lanceolate, long acuminate, *revolute to apex*, marginal teeth in pairs, *costa slender, long excurrent, with dentate, piliform point*; areolation rectangular, *papillae at the lower angles*; (2), leaves plane, obtuse, crenulate, the costa *ceasing below the apex, or percurrent, or somewhat excurrent*. Perigonal leaves broadly lanceolate, *gradually acuminate*.—(Essai, 410.)

Range:—Alaska, Canada and Greenland, south to California, Colorado and Minnesota, usually at considerable altitudes.

var. BOREALIS. (Hag.) Loeske, *Hedw.* **45**: 206. (1906).

Ph. fontana var. *borealis* Hagen, *Kgl. Norsk. Vidensk. Selsk.* 1888.

Stem but little branched; leaves dimorphous; the upper roundish-oval, crenulate at apex, costa ceasing below apex or sometimes percurrent; the lower leaves oval lanceolate, areolation lax, especially at the base.—(Essai. 412.) Range:—Alaska, Montana.

var. COMPACTA (Schimp.) Dismier, *Essai.* 413. (1908).

Ph. fontana var. *compacta* Schimp. *Syn. Musc.* Ed. 2: 220. (1876).

Tufts compact, closely interwoven with radicles, stems very long (15 cm.). Range:—Greenland, Labrador, British Columbia.

var. HETEROPHYLLA Dismier.

Varies from the type in that the stems end in very slender innovations which have the leaves distant, and wholly different in form and structure from those of the main stems. Range:—Selkirk Mts.

A boreal or alpine species which, while readily distinguished when in normal condition, approaches *Ph. fontana* when growing at lower altitudes. The shape and margin of the leaves, and the slender, piliform, excurrent costa give it a very distinct facies under the microscope.

All specimens of *Ph. acutiflora* Kindb., *Hedw.* **35**: 67. (1896),* examined were referable either to *Ph. fontana* or to the present species.

10. PHILONOTIS CAESPITOSA Wils., in sched. *Musc. Brit.* No. 278. Braithw., *Br. Moss Fl.* **2**: 210. t.77. E. (1893).

Tufts more or less dense, stems 5-7 cm. high, simple or branched, subverticillate; stem leaves, *secund, oval, lanceolate-acuminate, falcate, wholly plane, without plicae*, margin denticulate, the *teeth simple above and in pairs below*: papillae over the upper ends of the upper cells, but in the lower ones over the basal angles. Perigonal leaves very large, concave, *acute, rarely obtuse, with the weak costa vanishing at the apex, or slightly excurrent*.—(Essai, 397.)

* M. Dismier refers to this by error as *Ph. acutifolia*, Kindb.

Range:—Canada and Newfoundland to North Carolina, west to Missouri.

var. COMPACTA Dismier.

In compact cushions, the densely foliate stems 4-5 cm. long. Connecticut.

var. LAXA (Warnst.) Loeske & Warnst., *Hedw.* **45**: 104. (1906).

Ph. laxa Warnst., (non Limpr.) *Krypt. Fl. M. Brand.* **2**: 618. (1905).

Ph. fontana var. *ampliretis* Dixon, *Journ. of Bot.* 1902. p. 71.

Laxly tufted; stems 4-5 cm. soft and slender, leaves distant and patent.—(*Essai*, 399.)

Range:—New Brunswick, Conn., N. Y., N. J., D. C.

var. ADPRESSA Dismier, *Rev. Bryol.* **34**: 68. (1897).

Ph. adpressa Limpr., *Laubm.* **2**: 574. (1893), (desc. only).

Stems about 5 cm., laxly coherent, scarcely radiculose, slender, simple, without subverticillate branches, leaves dimorphous,—some like the typical form, others distant, erect, strongly appressed broadly ovate, shortly acuminate.—(*Essai*, 399.)

Range:—N. H., N. J., N. C.

var. HETEROPHYLLA Dismier.

Leaves of two forms:—the lower normal, the upper distant, appressed, short, broader, with strongly chlorophyllose cells.

Range:—Conn., Colo.

A frequent species in America but greatly misunderstood. For certain identification the direction, form and structure of the leaves from the lower portion of a stem, *not* those of the innovations should be studied. The typical leaves are plane, with a thin costa. The lower cells are quadrate and the upper ones elongate rectangular. The species is found exclusively upon a silicious substratum.

11. *PHILONOTIS FALLAX. Dismier.

Dioicous; cushions yellowish to brownish green, interwoven with brownish radicles below. Stems upright, 3-6 cm. high, simple or with verticillate branches beneath the inflorescence. Leaves closely set, secund, narrowly oblong-lanceolate, falcate, slenderly acuminate, revolute to the middle, the margins dentate throughout with paired teeth; the costa slender, excurrent into a dentate hair; areolation of rectangular cells, papillae over the lower end. Male inflorescence discoid, surrounded by 6-8 patent bracts which are oval-lanceolate, concave, obtuse, denticulate, gradually narrowed from a concave base, with a thin costa which vanishes below the apex. Seta dark red, erect, flexuose, 5-7 cm. long. Capsule subglobose, with a small, short-conic, acute operculum. Teeth of peristome of medium length; processes of endostome deeply divided, cilia 2-3; spores large, brown, papillose.

Range:—British Columbia to Quebec, south to Idaho, Minnesota, Wisconsin and Maine.

A species that at times approaches *Ph. fontana*, yet well differentiated by the narrow, falcate-secund, acuminate leaves and the slender, excurrent costa. It has been at times confused with *Ph. calcarea*.

12. PHILONOTIS CAPILLARIS Lindb Hedw. **6**: 40. (1867).

Dixon and Jameson, *Handbook*. Ed. 2. 325. t. 41.D. (1904.)

Ph. Macounii Lesq. & James, *Manual*. 203. (1884).

Ph. Arnelli Husnot, *Musc. Gall.* 268. (1890).

Ph. Ryani Philib., *Rev. Bryol.* **21**: 8. (1894).

Ph. vancouveriensis Kindb., *Eur. & N. Am. Bryin.* **2**: 326. (1897).

Ph. media Bryhn, *Kgl. Norsk Vidensk. Selsk. Skr.* 1899. No. 3. p. 39.

Tufts more or less dense; stems slender (0.15 mm), simple or branched, usually without innovations. Leaves erecto-patent, slightly secund, *oblong-lanceolate, long acuminate*, 1 x 0.3 mm. without plicae, plane or revolute below, *marginal teeth simple and acute*, either extending to base or in the upper portion only; costa slender, *excurrent and usually piliform-dentate*. Areolation of rectangular cells which are often in rows parallel to the costa, papillose above only, papillae over upper ends of the cells. Perigonial leaves oval, gradually acuminate, mucronate or obtuse.—(*Essai*. 392.)

Range :—Alaska, British Columbia, south to California and Idaho; Delaware Water Gap.

Usually upon a silicious substratum.

NOTES ON VERMONT BRYOPHYTES—VI.

A. J. GROUT

Mosses New to the State.

AMBLYSTEGIUM ORTHOCLADON (P. B.) Kindb. Common in mountain streams in Windham Co., probably elsewhere.

ANOMODON VITICULOSUS MICROPHYLLUS Kindb. Ledges on mountain side, Newfane. Det. G. N. Best.

CAMPYLIUM POLYGAMUM (B. & S.) Bryhn, Swamp Newfane.

CALLIERGON GIGANTEUM (Schimp.) Kindb., Rutland, Kirk.

DICHELYMA PALLESCENS B. & S. On sticks in ditch running into Otter Creek, Rutland, Kirk.

DREPANOCLADUS KNEIFFII (B. & S.) Warnst. var. PUNGENS, H. Mueller. Near Mallets Bay, D. B. Griffin.

D. EXANNULATUS FALCIFOLIUS Ren. Lake of Clouds, Mt. Mansfield.

D. EXANNULATUS FALCIFOLIUS Ren. forma VIRIDIS Ren. Rutland, Kirk.

D. FLUITANS JEANBERNATI (Ren). Grout. Various localities on Mt. Mansfield.

FONTALIS INVOLUTA Card. Grout Pond, Stratton, Det. Cardot.

LESKEA POLYCARDA PALUDOSA (Hedw.) Schimp. Rutland, Kirk.

PALUDELLA SQUARROSA (L) Brid. Brownington, E. J. Winslow. Reported in Bryologist Jan. 1911.

PYLAISIA POLYANTHA PSEUDO-PLATYGYRIA (Kindb.) Grout. Mountain woods, Sherburne, Kirk.

RHACOMITRIUM CANESCENS (Timm.) Brid. On sand bar along Cold River, Clarendon, Kirk.

SPLACHNUM AMPULLACEUM L., Jamaica, Dobbin.

Notes on Rare or Interesting Mosses.

ANOMODON TRISTIS; Mallets Bay, D. B. Griffin.

ANDREAEA ROTHII; Mt. Horrid and Mt. Killington, Dutton & Kirk.

CALLIERGON RICHARDSONI (Mitt.) Kindb. Shallow water Barnet, Dr. Blanchard. This specimen under this name has been in my collection so long that I have forgotten how I obtained it. It has not been given much attention before because I did not understand how to differentiate this species from *C. cordifolium*. It is distinguished from that species by the much narrower more vermicular leaf cells, with the alar cells abruptly enlarged and inflated, costa usually shorter and more slender, reaching $\frac{3}{4}$ the length of the stem leaves, usually shorter in the branch leaves. The areolation of *C. Richardsoni* is much like that of *C. giganteum* but in *giganteum* the costa is very much stouter, especially at the apex, and normally developed plants are plainly and quite regularly pinnate. It is probable that *C. Richardsoni* is not rare in mountainous regions in the northeastern United States.

DICRANODONTIUM LONGIROSTRE; Deer's Leap, Dutton & Kirk.

DICRANUM MUHLENBECKII (B. & S.) Twin Mt. W. Rutland, Kirk.

HYPNUM CUPRESSIFORME; typical but sterile; Mallets Bay, Griffin.

MNIUM HORUM L., Sherburne, Dutton and Kirk.

PHILONOTIS MUHLENBERGII; Brandon, Dutton.

TORTULA MUCRONIFOLIA; Proctor, Dutton.

Hepatics.

In Rhodora for October, 1910, Dr. Evans reports the following additions to the hepatic flora of the state.

Cephalozia connivens; Brandon, Dutton. *Cephaloziella elachista*; Woodstock, Miss Lorenz. *C. myriantha* (Lindb.) Schiff., Killington, E. H. Lorenz. *Lophozia alpestris*; Rochester, Dutton. *L. Badensis*;

Hartford, Miss Lorenz. *L. Kaurini*; Quechee Gulf, Miss Lorenz. *L. Mildeana*; Jerico, Evans. *Metzgeria furcata*; Woodstock, Dutton. *Scapania dentata*; Rochester, Dutton.

THE MINNEAPOLIS MEETING.

The sixth public meeting of the Sullivant Moss Society was held in Minneapolis, Minn., Dec. 27th and 28th, 1910, during the convocation week of The American Association for the Advancement of Science. A suitable room and equipment was furnished us in the congenial atmosphere of the University Herbarium at Pillsbury Hall.

The afternoon of Tuesday the 27th was spent in examining the exhibits of mosses, hepatics and lichens. Some unusually fine drawings illustrating their respective papers were exhibited by Miss Annie Lorenz and Miss Helen E. Greenwood.

Mrs. Annie Morrill Smith sent an interesting exhibit of the method of reproducing in the Bryologist the halftones, wood cuts, photogravures, etc., from the originals.

Wednesday a most enjoyable afternoon was spent by those present in reading and discussing the papers. A pleasant surprise occurred at this stage of the meeting when we walked our Secretary, Prof. N. L. T. Nelson.

Prof. J. M. Holzinger presided at the meeting in his genial and happy manner.

The following program was offered:

SULLIVANT MOSS SOCIETY.

Room 4, Pillsbury Hall, Ground Floor.

Prof. Bruce Fink, President.

N. L. T. Nelson, Secretary.

Prof. John M. Holzinger, Presiding Officer.

Geo. H. Conklin, M. D., Acting Secretary.

PROGRAM.

TUESDAY, DECEMBER 27, 2:00 P. M.

Informal reception and inspection of exhibits, drawings, apparatus, etc.

WEDNESDAY, DECEMBER 28, 2:00 P. M.

1. Address of Welcome to Eastern and Western Bryologists.
Prof. John M. Holzinger, Winona, Minn.
2. *Lophozia Kaurini* and its *Muelleri* Group Allies.
Annie Lorenz, Hartford, Conn.
3. Some Stages in the Development of *Pellia epiphylla*.
Helen E. Greenwood, Worcester, Mass.

4. Notes on an Exhibit of Mosses Collected in the Vicinity of St. John's University, Collegeville, Minn.
Rev. Jas. Hansen, Collegeville, Minn.
5. Two New West Coast Mosses.
Prof. John M. Holzinger, Winona, Minn.
6. The Genus *Usnea* and its Linnaean Nomenclature.
R. Heber Howe, Jr., Concord, Mass.
7. A Description of a Collection of Bartramiaceae with Specimens and Lantern Demonstration.
Miss Carlotta H. Browne, Philadelphia, Pa.
8. Notes on the Occurrence and Habitat of Some of the Principal Bryological Forms of the Coast Region of British Columbia.
Albert J. Hill, M. A., New Westminster, B. C.
9. The Rediscovery of *Parmelia lophyrea* Acharius.
Prof. Lincoln W. Riddle, Wellesley, Mass.
10. Notes on Southern California Hepaticae.
C. C. Kingman, Pasadena, Cal.
11. Preliminary Report on a Collection of Hepaticae, from the Duluth, Superior District, States of Minnesota and Wisconsin
George H. Conklin, M. D., Superior, Wis.
12. Bryological Notes and Reports:
 - (a) Prof. A. F. K. Krout, Glenolden, Pa., will present a specimen and report of a New *Fissidens* named by Thériot and Cardot, *Fissidens crassipes Pennsylvanica* N. Var. Theriot and Cardot.
 - (b) Prof. Edward B. Chamberlain, New York City, will report on new species.
 - (c) Exhibits of specimens have been promised by: Mrs. B. J. Handy, Fall River, Mass.; Miss Alice L. Crockett, Camden, Maine; Dr. Geo. H. Conklin, Superior, Wis.; Prof. John H. Sheldon, Morgantown, W. Va.; Prof. J. B. Flett, Tacoma, Wash.; Mrs. Elizabeth G. Britton, New York Botanical Garden, New York City; Mrs. Annie Morrill Smith, Brooklyn, N. Y.

Greatly to our regret, Miss Browne's presence was impossible, owing to an illness in her family, so that we missed her and her beautiful lantern slides.

A paper from Prof. Eikichi Iishiba, Sendai, Japan and another by István Györfy, Hungary arrived too late to be included in the official program but will be printed in the *Bryologist*.

The Secretary in Charge stated that the hearty response given by the members to all his requests for aid proved that the S. M. Society is very much alive and capable of doing excellent work. He would urge, however a closer coöperation between the departments of the Society. A close personal acquaintance of the heads of departments and officers and members at large would aid greatly in bringing this about,

We would earnestly urge that the future meetings be arranged in such a manner that they will not conflict with the general meeting of the Botanical Section of the A. A. A. S. *Future Secretaries take notice.*

The Society was fully represented in the official program and in the public press. Geo. Hall Conklin, M. D., Sec'y. in Charge.

NEW MEMBERS

- No. 191. Central Museum, Brooklyn Institute of Arts and Sciences, Eastern Parkway, Brooklyn, N. Y.
No. 192. Mrs. F. C. Smith, Jr., 889 Pleasant St., Worcester, Mass.
No. 193. Dr. Charles Atwood, Moravia, New York.
-

The blank pages in the March number were an unexpected gift from our new printer, as he furnished extra pages for the plates.

EXCHANGE DEPARTMENT

(To Society members only. For postage, send a self-addressed envelope, and do not forget the stamp.)

- Dr. H. S. Jewett, 15 W. Monument Ave., Dayton, O.—*Aulacomnium papillosum* (C. M.) L. & J. *Philonotis fontana* (L.) Brid. Collected in Colorado.
Dr. N. L. T. Nelson, Des Moines, Iowa.—*Sphagnum ruprestre* Limpr, Det. H. Vanden Broeck; collected in Belgium.
Mr. E. J. Winslow, Auburndale, Mass.—*Encalypta ciliata* Hedw.
Rev. S. M. Newman, Kee Mar College, Hagerstown, Md.—*Rhaphidostegium recurvans* (Schwaegr.) Jaeg.
Mr. Eikichi Iishiba, Higashi-sichibancho, Sendai, Japan.—for postage from one's own country. *Bartramia crispata* Sch. *Brothera Leana* (Sull.) C. M. Mss. *Brachythecium populeum* (Hedw.) B. E.
H. Dupret, Seminary of Philosophy, Montreal, Canada—*Cladonia turgida* Hoffm.; *Cladonia sylvatica* (L.) Hoffm. Collected in Canada.
Mr. George B. Kaiser, 524 Locust Avenue, Germantown, Pennsylvania—*Peltigera rufescens* (Neck.) Hoffm. Collected in Pennsylvania. *Lophozia inflata* (Huds.) M. A. Howe, Coll. N. Y.
Dr. John L. Sheldon, West Virginia University, Morgantown, West Virginia.—*Pertusara amara* (Ach.) Nyl. collected in Conn.
Mrs. B. J. Handy, 139 Rock Street, Fall River, Mass.—*Thuidium delicatulum* (L.) Mitt.; *Pogonatum brevicaulis* (Brid.) Beauv.; *Bartramia pomiformis* (L.) Hedw. All cfr. collected Fall River.

- Mrs. A. F. Browne, Bridgetown, Nova Scotia—*Hypnum imponens* Hedw. cfr. collected Nova Scotia.
- Mrs. Elizabeth M. Dunham, 53 Maple Street, Auburndale, Mass. *Thuidium Blandowii* (W. & M.) B. & S.; *Ulotia Ludwigii* Brid. cfr. Coll. in New Brunswick.
- Mrs. George M. Pendleton, Sisson, Sisykiou Co. California—*Tortula ruralis* (L.) Ehrh.; *Camptothecium aeneum* Mitt. *Orthotrichum speciosum* Nees; *Aulacomnium androgynum* (L.) Schwaeger. All cfr. Coll. California.

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With a little more paid advertising the Bryologist will become entirely self-supporting. Articles advertised are such as are known to the editor to be thoroughly reliable. By buying of our advertisers you will help yourself and the Society, but always mention that you saw the ad. in the Bryologist. When goods are bought of a dealer, drop a postal to the editor.

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THE BRYOLOGIST

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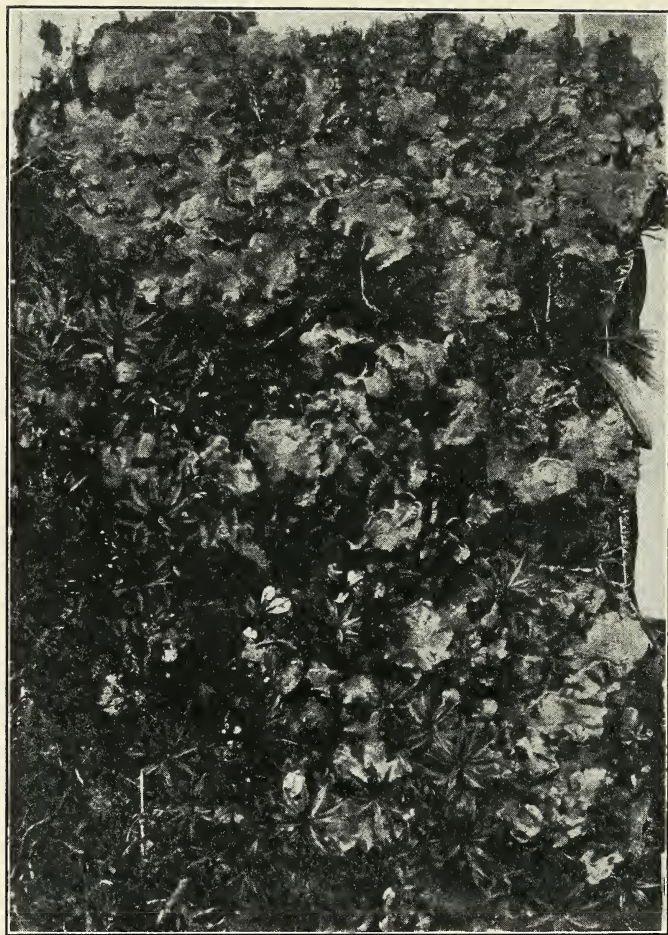


PLATE VII

Pellia epiphylla, nat. size. Collected and photographed Aug. 18.

Shows overlapping method of growth.

“ average shape of thallus.

“ position of involucre.

“ “ of antheridia.

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SOME STAGES IN THE DEVELOPMENT OF PELLIA EPIPHYLLA.

HELEN E. GREENWOOD.

[Presented at the Sullivant Moss Society Meeting, Minneapolis, Dec. 28, 1910.]

Pellia epiphylla, one of the more common hepatics in this locality, grows on the ground in damp shaded places, its favorite location being on the banks of streams, either submerged or just above the water line, or more often extending several feet from the water's edge. It may be found in smaller patches on damp roadsides in close proximity to *Anthoceros* and *Blasia*, and scattered plants are sometimes found on boggy soil in pastures and swamps.

The slightly fleshy thallus has no suggestion of leaves, and varies from a simple oblong shape to one more or less sinuate, lobed and forked. (Pl. VIII, figs. 4, 5, 6.) The plants tend to grow in masses and sometimes will cover the soil for several feet if no other plant growth crowds them out. The ends of the plants overlap each other in shingle fashion (Pl. VII) doubtless to prevent too rapid evaporation of moisture.

This crowding together of the plants gives rise to a great variety of shapes. Those growing underneath or in more shaded positions take on a narrow, slender shape (Plate VIII, figs. 4a, 4b) while those having a greater exposed surface fork and fork again and broaden out horizontally (Figs. 5, 6a).

The color, texture and fruiting tendency of the thallus, varies somewhat according to the place of growth, this difference seeming to be governed by the amount of moisture available. The plants growing in drier locations are of a pale, dull-green color and the region of the costa is often characterized by a reddish or purplish tinge. These plants are thinner and more solid in texture than those growing in very moist situations. The plants growing close to the water's edge or on very wet soil have, in comparison, a rank luxuriant growth, the cell structure of the plant body being less compact. These plants have a richer, brighter green color with no trace of the purple tinge noted above.

Although the plants in moist situations have a more vigorous growth, they are far more likely to be sterile than those of drier locations, the latter being almost invariably well fruited. But when those in moist situations do form fruiting organs they are much farther advanced at the same season than those of a drier habitat.

The structure of the thallus is comparatively simple. A longitudinal section shows a slight degree of cell differentiation and a lack

of intercellular spaces. Fig. 8 illustrates a portion of a vertical section of a plant collected on July 10, which shows three somewhat clearly marked regions. There is an outer layer of epidermal cells, longer and narrower and more compact than the layers of chlorophyll-bearing cells below, which are bordered underneath by a double row of epidermal cells, from the lower of which the rhizoids develop. All the plants are provided with a thick mat of rhizoids which cling so tightly to the soil as to make it a very difficult matter to remove the particles of earth thoroughly enough for the safe cutting of material imbedded in paraffine.

Pellia epiphylla is monoecious, the archegonia being formed in groups just back of the growing point and the papilla-like antheridia being borne on the upper surface of the thallus, more abundantly close to the midrib and toward the growing point, where they seem to slant a little forward in that direction. Their number is very variable as can be seen from the photograph in Pl. VII. These antheridia appear very early in the life of the plant, oftentimes being found in abundance on the tiny new thalli that spring out at the edges of the old plants, shortly after the spores are shed in the middle of April, and these antheridial dots persist throughout the life of the plant, being plainly seen even after the thallus has become brown in color and has begun to die down and disintegrate.

The archegonia are formed in groups of varying numbers and are borne on the upper surface of the thallus just behind the growing point (Figs. 25, 26, 27b, 30*). They do not terminate its growth but usually after the appearance of the archegonia the forking of the costa begins at this point and two new divisions of the thallus develop more or less equally on either side, while the fertilized archegonium left at this point of division develops into a sporogonium (Figs. 4e, 4f). Archegonia may again appear just back of the tips of these new branches. As soon as the archegonia are formed a layer of tissue grows¹ out above and below (Figs. 26, 27a, 27b). The upper protective layer, called the involucre, grows forward horizontally until it

1. The development of the archegonium is described in "The Structure and Development of Mosses and Ferns," by D. H. Campbell, Ph. D., as follows:

"After the archegonium mother cell is cut off it does not at once divide by vertical walls, but there is first cut off a pedicel, after which the upper cell undergoes the usual divisions." "The archegonium mother cell * * * is divided by a transverse wall into a basal cell and an outer one from which the archegonium itself develops. The divisions in this outer cell are remarkably uniform. Three vertical walls are first formed intersecting so as to enclose a central cell. In this central cell a transverse wall next cuts off a smaller, upper cell (cover cell), from a lower one. Subsequently the three (or in the Jungermanniaceae usually but two) first formed peripheral cells divide again vertically and by transverse walls in all of the peripheral cells, and somewhat later, in the central one. Also, the young archegonium is divided into two tiers, a lower one or venter and an upper one, the neck. The middle cell of the axial row, by a series of transverse walls gives rise to the row of neck canal cells and the lowermost cell divides into two, an upper one, the ventral canal cell, and a lower one, the egg." p. 16 & p. 90. 1895.

*In Sept. no.

reaches the end of the group of archegonia (Pl. VIII, figs. 4d, 6b, 6c). This fold of tissue remains lifted up from the thallus for a time, perhaps until after fertilization has taken place. *Later* these involucre are pressed tightly down upon the thallus underneath, securely enclosing the sporogonium. The number of archegonia formed seems to vary considerably, sometimes there are only nine or ten, and again there may be more than twenty (Fig. 29a). But ordinarily only one develops into a sporogonium, although twice I have found two full-grown sporogonia of equal size growing together under the same involucre.

After fertilization the archegonia develop through the summer and autumn months into sporogonia which reach their full development by the last of October. These are composed of a foot, stalk (seta) and capsule, and remain hidden away under the tightly fitting involucre during the winter months until April, when the spores are ripe. Then the stalk which has remained short, suddenly elongates vertically to the height of an inch or more (Figs. 7a, 7b) the walls¹ of the capsule split vertically into four valves and the spores are shed. The foot is the basal portion of the stalk and in *Pellia* "is very distinct and forms a pointed conical cap whose edges overlap the base of the seta²," (Figs. 37, 38, 39, 43, 44).

The study in preparation for this paper was undertaken with the purpose of finding out when the more important stages in the life history of *Pellia epiphylla* occurred.

For this reason material has been collected in every month of the year, beginning in April when the spores are shed and the new plants begin their growth and continuing until the following April, when the life cycle has been completed. Collecting for this work was begun in 1908 and was continued during 1909 and 1910 as opportunity offered. Collections have been made from different localities about the city of Worcester, Mass., where *Pellia epiphylla* was to be found in fairly large amounts. For fixing agents several different chromacetic solutions were used with satisfactory results. The formula best suited to the earlier stages (those collected from April-July) was composed of 1 gram. chromic acid, 4 cc. glacial acetic acid, 100 cc. H₂O.

1. "The growth of the seta after the spores are ripe is extremely rapid, but consists entirely in a simple elongation of the cells. Askenasi (Wachstum der Fruchstiele von *Pellia epiphylla*. Bot. Zeit. 1874, p. 237) has investigated this in *Pellia epiphylla* and states that in three or four days the seta increases in length from about 1 mm. to in some cases as much as 80 mm., and that this extraordinary extension is at the expense of the starch which the outer cells of the young seta contain in great abundance, but which disappears completely during the elongation of the seta."

D. H. Campbell, l. c. p. 93.

2. D. H. Campbell, l. c. p. 92.

While the following formula, 70 cc. one per cent. chromic acid, $\frac{1}{2}$ cc. glacial acetic acid, 30 cc. H_2O , gave better results with the different stages of the sporogonia. Carnoy's fixing fluid was used twice in order to save time, and although the material fixed in this solution took a very brilliant stain with the saffranin gentianviolet combination, more or less shrinkage resulted. This, however, might have been prevented if the material had not been hurried too rapidly through the infiltrating and imbedding process.

The plants were either put into the fixing solution in the field or soon after carrying them home. When such a delay was necessary the material was kept in a tightly covered tin box until placed in the chromacetic solution. In the earlier stages after removing the dirt from the rhizoids with needles, entire plants may be placed in the fixing solution. But after July, when the young sporogonia begin to develop, the thallus should be trimmed down nearly to the sporogonium. The capsules should be pricked and the surrounding membrane removed, otherwise bubbles will form making it impossible for the fixing solution to penetrate, and later the paraffine, thus making the infiltration process a failure.

After fixing for about 24 hours, the material was washed in running water for about 12 hours and then was carried through the usual solutions of alcohol, viz.: 15 per cent., 35 per cent., 50 per cent., 70 per cent., comparatively short periods (3 hours) being sufficient for the weaker alcohols. In 70 per cent. alcohol much of the material had to remain for a long time, from several months even to a year.

When ready for imbedding the material was carried from 70 per cent. through 85 per cent., 95 per cent., two changes of absolute alcohol and through the three solutions of absolute alcohol and xylol into pure xylol and was finally imbedded in paraffine melting at $54^{\circ}C$. The sections were cut with a Minot rotary microtome, being three, four or five microns in thickness.

In the earlier stages great trouble was experienced from shrinkage of the tissues. After the loss of much time and good material it became evident that the difficulty, though caused partly by insufficient washing, was chiefly due to allowing for too short periods in the absolute alcohol and xylol solutions and also to hastening the process of infiltration. Moreover, when all had gone well up to the last solution in xylol everything was, sometimes ruined by adding the paraffine in too large pieces. Even in the most refractory material, shrinkage was always avoided by letting it remain a long time (24 hrs. or longer) in the absolute alcohol-xylol solutions and then putting only the smallest, thinnest shavings of paraffine into the pure xylol, letting each dissolve before adding the next.

After many trials and experiments I worked out the following schedule which gave uniformly good results.

Schedule for imbedding *Pellia epiphylla*.

Fixing solution 24 hours or more.

Wash in running water 12 hours or more.

15 per cent. alcohol, 3-6 hours.

35 per cent. " 3-6 hours.

50 per cent. " 3-6 hours.

70 per cent. " 6 hours-anytime.

85 per cent. " 4-12 hours.

95 per cent. " 12-24 hours.

abs. alcohol 1st sol. 12 hours or more.

" " 2nd " 12 hrs. or more.

abs. " ($\frac{2}{3}$) + xylol ($\frac{1}{3}$) 24 hrs. or longer.

" " ($\frac{1}{2}$) + " ($\frac{1}{2}$) 24 hrs. or longer.

" " ($\frac{1}{3}$) + " ($\frac{2}{3}$) 24 hours or longer.

Too much emphasis cannot be laid on the necessity of long periods in the last three solutions.

xylol 1st sol. 12 hrs. or longer. Drain thoroughly.

xylol 2nd sol. 2 or 3 hours or longer.

Then begin to add paraffine *very slowly in minute* shavings. As the solution becomes saturated larger pieces may be added with greater frequency. The material seemed to be benefited by remaining some time in the xylol-paraffine mixture. A week or ten days gave good results, and apparently a longer time would do no harm.

Soft paraffine melting at 37° C. was used and the greatest care was necessary to see that the temperature did not rise above that point. The shortest time that it was safe to leave the material in the paraffine oven was 24 hours, and during that time, the paraffine solution should be poured off at least three times and renewed with shavings of paraffine of the same melting point. A longer time than twenty-four hours is desirable and the more times the paraffine is changed the better the result will be.

In transferring from soft to hard paraffine, again the greatest care must be taken that the temperature of the latter shall not be too high, or shrinkage will result and all the painstaking work of previous days or weeks will be lost. One successful method is to heat the hard paraffine on an iron stand and allow it barely to reach the melting point. and then pour out into a paper tray. The material in the soft paraffine can then be taken from the oven and transferred to this and with hot needles each piece can be carefully oriented. The paper trays should then immediately be floated on cold water until thoroughly cooled. If they are taken out of the water and allowed to dry thoroughly, the paper will easily peel off from the paraffine cakes

without having recourse to the inside coating of glycerine which makes them so unpleasant to handle. The specimens are then ready for sectioning in an hour's time.

Hard paraffine if melted over several times before being used for imbedding will cut very much better than that taken directly from the new cake. But the greatest care must be taken not to let it get too hot by letting the temperature rise too much above the melting point.

The attempt to use xynthol instead of absolute alcohol resulted in failure, for material in good condition up to the time of transference to a xynthol solution became so shrunk and dried that it was worthless. Neither did xynthol work well in dehydrating the slides in the process of staining.

In regard to the stains that were used, Delafield's haematoxylin was found to be most satisfactory for antheridia and archegonia and Fleming's triple stain of saffranin, gentianviolet and orange G for the later stages. For this work over forty different collections of *Pellia epiphylla* have been made, the number for each month depending upon the activities of the plant, seven collections being made in June, against one each in the months of December, February and March.

These different collections will now be considered in order, beginning with the earliest date on which the new season's growth was found.

April 15 one of the best collecting grounds of the city was visited. Here within the space of a few feet quite a variety of stages was found. The plants on the bank a few feet back from the river's edge were dried down and the sporogonia hardly protruded from under their protecting membranes. On a tussock directly over the water was a mass of plants with sporogonia that had pushed up on stems an inch or more in length with capsules that seemed just ready to open. Others had already opened and had shed their spores, only the brown tufts of fixed elaters at the center of the base of the capsule being left. Between these extremes of dry and moist conditions the sporogonia were found in various stages. Some were just ready to shed their spores, others had pushed up only a short distance, others were just protruding beyond the involucre. Those whose stems seemed to have grown to full height, or whose spores had been discharged showed a thallus much reduced. Generally nothing was left of the old plant but a thin narrow band, dark brown in color, and the sporogonium instead of being some distance back from the growing point now seemed to be at the very tip of the thallus (Figs. 7a, 7b). New bright-green shoots, more or less folded and curved, were to be seen springing out from the edges of the old plants which seemed about to die down and disintegrate (Figs. 2, a, b, c, d, e).

The next collection was made on April 21, at the same place. Almost exactly the same variety of stages of sporogonial development

was to be seen. Near to the water's edge were the long stems of the capsules surmounted by their brown tufts of elaters. Then farther and farther back from the water were all lengths of stems of capsules back to the little sporogonia that had not as yet pushed out from under their protecting involucre and seemed to have no intention of leaving winter quarters. But all the thalli showed new growth. New shoots had developed at the edges of the old plants, and on many of these the antheridial dots were already evident to the naked eye. These new plants were so tender and delicate that it was very difficult to remove the dirt particles without utterly destroying the specimens. They gave great trouble in the imbedding process, either by shrinking, or by curling up and folding together, so that when they were finally in place in the hard paraffine it was nearly impossible to cut a good longitudinal section. However, patience and perseverance made it possible to get some satisfactory sections which showed various stages in the development of the antheridia. Fig 29 represents a nearly median longitudinal section through the growing point and shows four stages of antheridial development, the most immature being near the growing point. The farther away from the growing point they are found the more maturity of development they will have.

In regard to the development of the antheridia, Campbell says ¹ that each arises from a single superficial cell (Figs. 10 & 10a) which first divides into a stalk cell and the antheridium mother cell (fig. 11). The stalk later becomes multicellular, while the antheridium mother cell is divided into two equal parts by the formation of a vertical wall (fig. 12). ² "Next in each of these, two walls arise intersecting each other as well as the median wall and divide each half of the antheridium into three cells, two peripheral ones and a central one. The peripheral ones do not reach to the top of the antheridium and next a periclinal wall is formed near the top of the central cells by which a third peripheral cell is formed in each half of the antheridium, which now consists of two central cells and six peripheral ones." "The latter ³ divide only a few times*." "The inner cells give rise to a very large number of sperm cells."

Only a few of the stages of development of the antheridia were found in this material, but these few were found repeatedly in all the material gathered in April and May. Figs. 10 and 10a show the cell from which the antheridium is to develop, plainly distinguished by its large nucleus and the deepness of the stain. Fig. 11 shows the two-celled stage with the stalk cell and the antheridium mother cell having a large nucleus and taking a deep stain. Fig. 12 shows the first division of this antheridium mother cell into two cells by means of a vertical wall. No other stages were found until the more advanced one in which the central group of cells, which by division will form

1. D. H. Campbell, l. c. pp. 16, 92 and 85. 2. l. c. p. 85. 3. l. c. p. 16.

the sperm cells, has been differentiated from the outer single layer of sterile cells which form the wall of the antheridium (Figs. 13 and 14). Fig. 15 shows what appears to be a mature antheridium, the central space being occupied by many sperm cells. Thus it would seem that the antheridia may be fully formed by the latter part of April.

By means of the division of cells adjacent to the young antheridium it soon becomes surrounded by a partition and each becomes sunk in a little cavity or pocket (Figs. 11, 13, 14, 15).

On April 28, more material was collected from the same place. The young shoots showed considerable growth in a week's time. Again there was a great difference to be seen between the plants growing close to the water and those on the drier bank a few feet away. The former were much larger in size and more rank in growth, while the latter were small in size and thin in substance. The papilla-like antheridia showed plainly. All the capsules had opened, but the stems surmounted by the tuft of elaters were still standing. Sections through this material showed no special difference from that gathered on April 21, so no figure is given.

May 6 was the next collecting day, and this time another locality was visited, where the plants were growing at the river's edge. These plants showed a marked increase in size over the preceding, and were very rank in growth and bright green in color. Sections of this material showed no marked advance over that gathered earlier, only there was a greater proportion of the more mature antheridia and fewer of the early stages were to be found.

[TO BE CONTINUED.]

EXPLANATION OF FIGURES

These drawings were made with a Bausch and Lomb microscope, using $\frac{2}{3}$ and $\frac{1}{6}$ objectives, and 1 inch and $\frac{3}{4}$ inch eyepieces.

The sections were four or five microns in thickness.

Figs. 8—31 were stained with Delafield's haematoxylin.

Figs. 31—51 were stained with the saffranin gentianviolet and Orange G combinations.

EXPLANATION OF PLATE VIII

Fig. 2. a, b, c, d, e. New thalli springing out from edge of old plants, collected April 21. c_1 , d_1 , e_1 . Old plants.

Fig. 2. f. Characteristic shape of thallus, June 28.

Fig. 3. a, b, c. Varying shapes of thallus, July 4. a_1 , c_1 . Old plants.

Fig. 4. a, b, c, d, e f. Different shapes of plants, Aug. 16. c_1 . Old plant. e & f. show position and appearance of young sporogonium at this time with involucre dissected away.

Fig. 5. Thallus collected Aug. 18, shows forking tendency when no surrounding plants interfere with growth.

Fig. 6. a, b, c. Collected Aug. 6.

6, a. Characteristic shape growing on wet leaves near the water.

- 6, b & c. An average shape of thallus, shows position of antheridia and involucre.
- Fig. 7. a & b. Plants collected April 15.
c. Calyptra.
Capsule has been pushed through this by the lengthening of seta and is just ready to open and shed the spores.
Thallus much dried down and reduced in size.
- Figs. 1—7. All nat. size.
- Fig. 8. Vertical section through thallus $\times 80$, collected July 10.
e, epidermal cells. p, parenchyma cells. r, rhizoids. 5μ thick.
- Fig. 9. Young sporogonium, Aug. 17, $\times 20$, capsule plainly differentiated, seta hardly at all. n, withered neck of archegonium.
-

EXPLANATION OF PLATE IX

DEVELOPMENT OF ANTHERIDIA

All median longitudinal sections and $\times 233$.

- Fig. 10. Earliest stage, single superficial cell, May 29 (4μ).
- Fig. 10, a. Same stage as 10, Apr. 21 (4μ).
- Fig. 11. Two-celled stage, stalk cell and antheridium mother cell, Apr. 21 (4μ).
- Fig. 12. First division of the antheridium mother cell by vertical wall, Apr. 21 (4μ).
- Fig. 13. More mature stage. May 29. Shows characteristic shape of stalked antheridium enclosed in protecting cavity. Central cells by division will form sperm cells surrounded by layer of sterile cells (5μ).
- Fig. 14. Somewhat more advanced stage than fig. 13, Apr. 21 (4μ).
- Fig. 15. Mature antheridium, Apr. 21 (4μ).

DEVELOPMENT OF ARCHEGONIA

All $\times 233$.

- Fig. 16. Two early stages of archegonia from Fig. 26, June 14, median long. section.
16a. Single superficial cell; one celled stage.
16b. Two-celled stage, archegonium mother cell ready to divide into two.
- Fig. 17. Two-celled stage, July 10, median long. section.
- Fig. 18. First division of archegonium mother cell, June 14, median long. section.
- Figs. 19 & 20. June 14.
Shows central cell set off from peripheral cells, optical section.
- Figs. 21, 22, 23. Median longitudinal sections of more advanced stages, July 10.

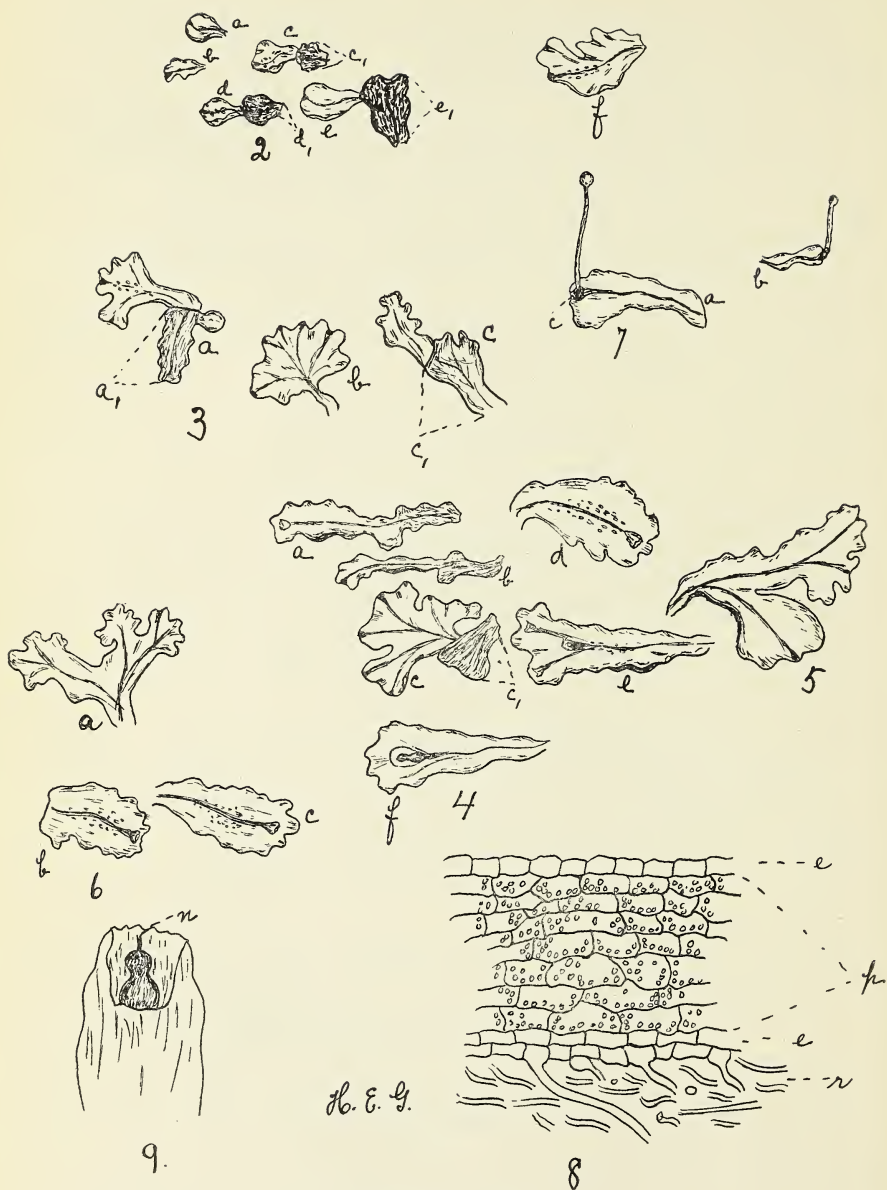


PLATE VIII

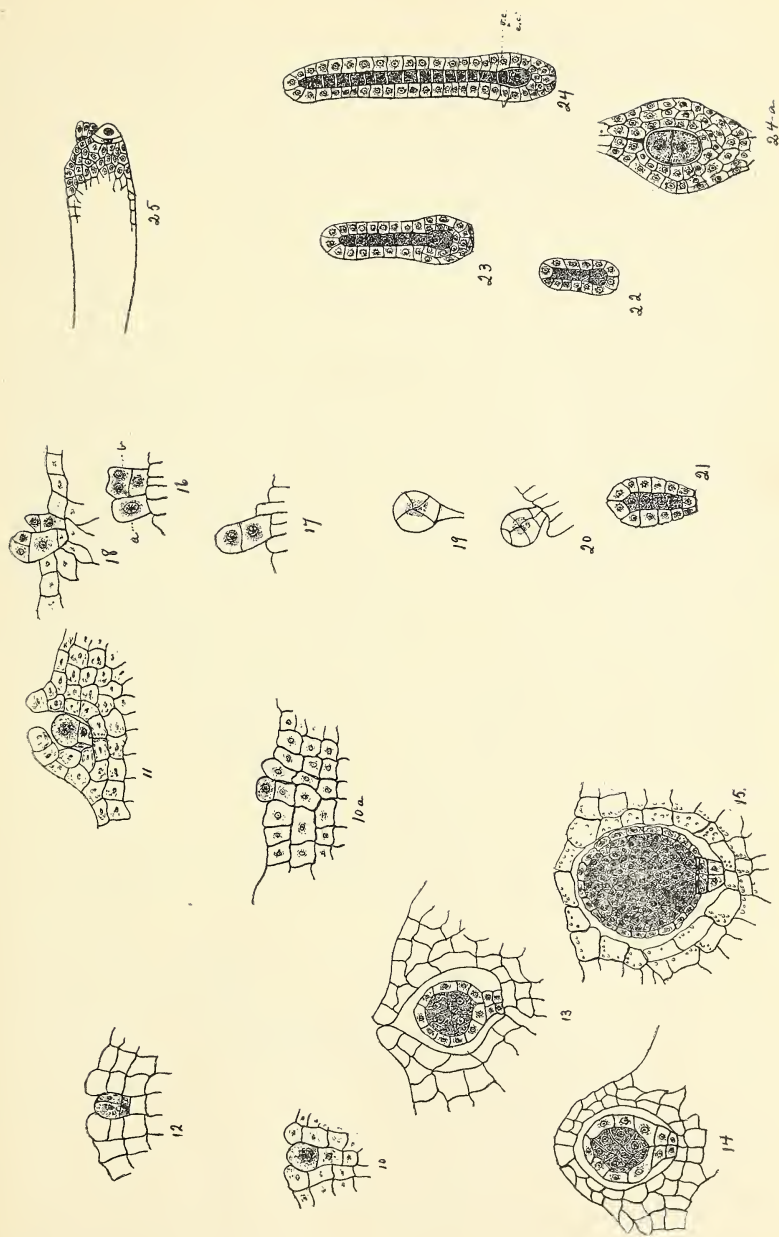


PLATE IX

- Fig. 24. Mature archegonium, median long. section, June 14.
v. c., ventral canal cell. e. c., egg cell; and 16 canal cells.
Fig. 25. median long. sect. through growing point of thallus $\times 110$.
June 14. Young archegonia. In drier soil.
Fig. 24a. Median longitudinal section through venter of archegonium, July 26. Young embryo, 2-celled stage. Increase of cell division in walls of venter.
-

AUSTINELLA gen. nov.

R. S. WILLIAMS

Dioicous: stems with few radicles, a distinct central strand and brown outer walls composed of about three rows of thick-walled cells; leaves spreading-flexuous, from a very broad, imbricate base abruptly narrowed to a narrowly lanceolate, grooved point; leaf margins flat or mostly so and serrulate above; cells of leaf lamina distinct and nearly or quite smooth on both sides; costa stout, semiterete, excurrent, somewhat rough on the back above, in cross-section near middle showing 9 or 10 guide-cells with stereid bands and more or less numerous accessory guide-cells both above and below, outer cells somewhat differentiated; cells in lower leaf linear to somewhat elongate hexagonal with more or less colored, mostly thickened, rarely slightly pitted walls, the alar not distinctly differentiated; the upper leaf of angular cells, nearly square to 2 or 3 times longer than wide, the narrow upper blade or margin of a double thickness of cells.

This genus is near *Trichostomum* but has a broad, clasping base to the leaf, and cells of upper leaf angular and not papillose.

Austinella Rauei (Aust.) gen. nov.

Syrhophodon ? *Rauei* Aust. Bull. Torr. Bot. Club, 6: 74. 1876.

Dicranum fulvum Hook, fide Lesq. & James, Manual, 70. 1884.

Dicranodontium inundatum Small, Exsiccati, Mosses of Southern U. S. (nomen undum).

Dioicous, male flowers, 2 or 3 in number, scattered along upper stem on very short, axillary branches, the outer perigonal leaves abruptly narrowed and spreading from a short, broad base, the inner much shorter, entire, enclosing about 6 antheridia with few, shorter paraphyses: in extensive mats, dull yellowish green at the surface, dark brown within; stems with central strand and about 3 rows of thick walled outer cells, slightly radiculose below, somewhat branching above, up to 2 or 3 cm. high; upper stem leaves 4 or 5 mm. long, spreading-flexuous, scarcely crispate, from a clasping, ovate or obovate base scarcely 1 mm. long with margin not quite entire, abruptly narrowed to a somewhat grooved, lanceolate point 3 or 4 times longer, irregularly serrulate on the flat margins about one-half down, smooth

or nearly so on both sides or somewhat rough on back toward apex; costa at base about 100μ wide and one-fourth width of leaf, semiterete, slightly excurrent, in cross-section showing 9 or 10 guide-cells with stereid bands and some accessory guide-cells above and below and outer cells more or less differentiated; cells of lower leaf mostly rectangular with somewhat thickened, brownish walls, rarely slightly pitted, the alar often broader, very rarely forming a rather distinct group; cells of upper leaf shorter, square to rectangular, about 6μ wide and 1 to 3 times longer; the narrow blade or border of upper leaf of a double thickness of cells; fruit unknown.

Type locality. Onoko Glen, Pennsylvania. E. A. Rau.

Distribution. Only known from type locality and Tallulah Falls, Georgia.

Exsiccati. Small, M. of the Southern U. S. no. 51.

This moss has much the appearance of *Trichostomum Hibernicum* (Mitt.) Dixon, but this latter has a narrower leaf base, leaf point stouter and entire, and cells papillose and rounder above. It is at once distinguished from *Dicranum fulvum* by the broad, imbricate leaf base, the stems without tomentum, the costa thicker and one-half as wide, and the lack, mostly, of a distinct alar group of cells.

New York Botanical Garden.

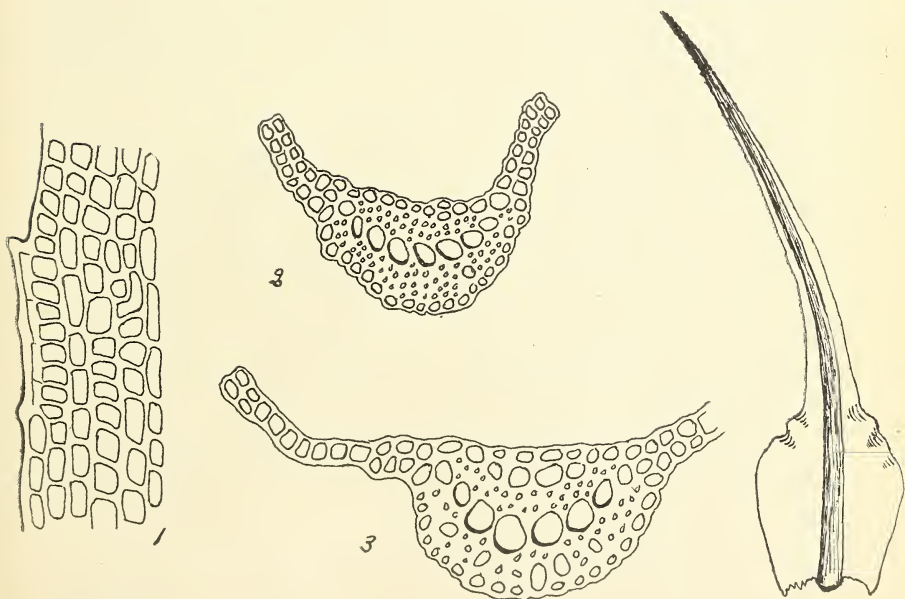


Fig. 1. *Austinella Rauaei*. Median leaf-cells $\times 270$. 2 & 3. Cross-sections of costa $\times 270$. 4. Upper stem leaf $\times 16$.

NOTES ON NORTH AMERICAN SPHAGNUM. I

BY A. LEROY ANDREWS, PH. D.

Descriptions of North American species of *Sphagnum* drawn up for the "North American Flora" call for a number of explanatory details beyond the scope of that work, and it is my purpose to embody such details in a series of notes, combining them with various suggestions which I trust may be of service to American bryologists in the study of the genus. That any revision of the genus must resolve itself very largely into a criticism of Warnstorf's views is so inevitable that I trust the fact will account for my frequent mention of that eminent bryologist's name.

I would at the outset expressly say that it is with the greatest personal regard for Herr Warnstorf and admiring recognition of his services to sphagnology that I find myself obliged to dissent from a good many of his published opinions.

I am indebted to the kindness of so many persons for material and for other favors that it is impossible to mention all here, but I shall have occasion to allude to many in the course of the notes. I am especially grateful to the directors of the New York Botanical Garden for a two months' fellowship in the summer of 1909, giving me access to the library and collections of the Museum, and to Mrs. Britton for her constant kindness and coöperation.

I. THE GROUPS

The first to attempt a division of the genus into subgenera was Lindberg, who in his invaluable monograph¹ proposed these subgenera 1. *Eusphagnum*, containing nearly all the species, 2. *Isocladius*, with *S. macrophyllum* and its synonym, *S. cribrosum*, and 3. *Hemitheca*, with *S. Pylaesii* and *S. cyclophyllum*.² The last two subgenera, separated in the one case by the lack of fibrils in the hyaline leaf cells, in the other by the form and texture of the capsule, have not maintained themselves, as the relationship of *S. Pylaesii* to *S. subsecundum* has long been recognized. *S. cyclophyllum* is perhaps not even specifically distinct from the same, and it may be added that *Sphagnum macrophyllum* appears also to find its nearest relative in this species.

A division of definitely permanent value was first established by Russow, who recognized a division into two groups³: I INOPHLOEA,

-
1. Europas och Nord Amerikas Hvitmossor, Helsingfors, 1882.
 2. The subgeneric names appear, accredited to Lindberg as sections, in Braithwaite's "Sphagnaceae of Europe and North America" 1880, while *Isocladius* (as a genus was proposed by Lindberg as early as 1862 (Ofvers. Kongl. Vet. Akad. Forh. **19**: 133).
 3. Zur Anatomie der Torfmoose, Dorpat, 1887, p. 27 f.

II LITOPHLOEA, the latter with several subgroups. This division he based upon the fact that in I the cortical cells of stem and branches are fibrillose, i.e. have their walls inwardly beset by spirally ascending thickenings of the membrane, while in II this is never the case. As a matter of fact this is but one of several characters which separate these two very distinct types of *Sphagnum*.

The cortical branch-cells of I are relatively large and entirely homogeneous, the outer wall commonly containing a large round pore at upper end, sometimes also a second one below, while in II these cells are usually differentiated into two sorts, only the longer ones having a pore, and this terminating a longer or shorter neck-like extension of the cell-wall, the larger cells being then roughly flask- or retort-shaped; in the few species which show uniform cortical branch-cells, either the cells are all somewhat retort-shaped, or the retort-cells are almost or entirely suppressed.

A fundamental difference of leaf-structure finds its most conspicuous expression in the fact that the branch-leaves of *Inophloea* are cucullate, while those of *Litophloea* are never so, but toothed across a broader or narrower curved or truncate apex, a relation explaining in the former case the origin of the specific name, *S. cymbifolium*, and so of the current group-name, *Cymbifolia* for *Inophloea*. In *Inophloea* the outer surface of the branch-leaf is roughened in the vicinity of its apex, as shown in Braithwaite's figures, a condition produced by the strongly projecting membrane of the hyaline cells, their outer membrane in this region being resorbed in a large gap in the end of the cell nearest the apex of the leaf, leaving the remaining membrane of the lower part of the cell projecting with marked convexity; this condition of things is entirely foreign to *Litophloea*. The leaves of *Litophloea* show furthermore border-differentiation not found in *Inophloea*, the margin, aside from the toothed apex, being bordered by two or more rows of narrower, thinner, cells; in *Inophloea* the network of alternating chlorophyll and hyaline cells simply ends with a chlorophyll-cell on whose outer side the so-called resorption-furrow represents the beginning of what would have been the next hyaline cell. If one look at the leaf-edge as the leaf lies flat on the slide, this remnant of the next hyaline cell appears as a very slender, nearly hyaline strip outside the last irregular line of chlorophyll-cells, somewhat broadened at cell-ends, where rudimentary traces of outwardly forking chlorophyll-cells give the margin a denticulate effect.

The stem-leaves as a further aspect of the same structural principle show in *Inophloea* the hyaline cells merely uniformly narrowed throughout the basal part of leaf, while *Litophloea* has invariably a side-border of several rows of narrow cells, and usually in addition a strong tendency to a suppression of the hyaline cells in the whole basal side regions (though the middle base always shows

hyaline cells), a condition of things spoken of by Warnstorf in his descriptions as a strong broadening of the border downward.

In the perichaetial leaves the difference is carried still further, as in *Inophloea* the characteristic suppression of hyaline cells in favor of uniform long, narrow cells alone is confined to the basal and middle portion of the leaf, a generally broad lateral and apical region being formed of the normal network of chlorophyll-cells alternating with fibrillose hyaline ones; in *Litophloea* on the other hand, if there be any such formation of a tissue of uniform narrow cells, it is in the basal, lateral, and apical region of the leaf, and may even occupy the whole; if it leave a portion with the normal network of alternating chlorophyll and hyaline cells, it is always the upper middle portion and the hyaline cells are here usually, but not in all species, without fibrils.

In proposing these two divisions as "groups," Russow evidently intended to express no opinion as to the relative rank of this category, except that it was of less than generic value, and Warnstorf retains his names as series ("Reihen"),² calling Russow's "subgroups" in this publication "sections." As the Vienna rules prescribe the ranking order: genus, subgenus, section, subsection (series, subseries), species, I am, I take it, making no essential change in designating Russow's groups as "subgenera." The names, as neuter plurals of adjective forms, do not agree with the recommendations of the Vienna Congress for subgeneric names. but can perhaps be regarded as substantivised feminine singulars. No species has been discovered showing intergrading forms, and the two lines are in every way so distinct that I have no doubt they may ultimately be recognized as separate genera.

Russow's "subgroups" were in no sense original with him, but represent simply a step in a long series of attempts to "arrange" the European species of *Sphagnum*. As a working-grouping of the European forms their value is beyond question and they are used with little change by Warnstorf. That they were not, however, final, is best shown by Warnstorf's not over successful attempt to apply them to the exotic species.³ Of the ten groups recognized in this work *Sericea* and *Mucronata* are, it seems to me, ill founded; the western North American *S. mendocinum* so unites *Cuspidata* and *Subsecunda* that their separation becomes arbitrary; the Central American *S. platycladum*, which clearly belongs with the *Acutifolia*, is placed with the *Truncata*, a group previously represented by the arctic *S. Aongstromii* alone, with which species it is far from being closely related; and another member of the *Acutifolia*, the South American *S. gracilenscens* is included among the *Subsecunda*. Warnstorf's mistakes only serve to illustrate how tentative the European grouping necessarily was, how closely related to each other most of these groups are, especially when their exotic species are included with them, and

2. Kryptogamenflora der Mark Brandenburg I. 1, p. 318 ff. 1903.

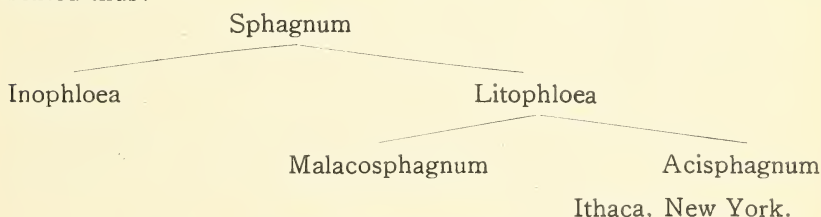
3. Engler und Prantl, Die natuerlichen Pflanzenfamilien I. 3, I, p. 251 ff. 1900.

how impossible it becomes to devise any key that will separate them even by a single constant character.

In this confusion of groups one stands out distinct in general appearance and certain anatomical characters, viz., the *Rigida*. This I have distinguished as an independent section, using the appropriate sectional name given it by Carl Müller in 1887,⁴ *Malacosphagnum*. The other groups differ so very little from each other in comparison with their common difference from this group that I have not hesitated to include them in a single section, using for it the sectional name proposed by Carl Müller for the *Cuspidata*, viz. *Acisphagnum*. Of the disposition of its numerous species I shall speak later on.

The most characteristic feature of *Malacosphagnum* is its cortical branch-cells, which are homogeneous, all of the flask or retort type, though the neck may be very short and inconspicuous, while in *Acisphagnum* they are of two sorts. the retort-cells larger and occurring singly or in twos, one above the other, in the axils of the leaves. This difference is noted by Carl Müller (Berol.),⁵ but has not previously been made a basis for classification. It forms a clearly recognizable diagnostic character separating two natural groups.

Of the two sections, *Malacosphagnum* seems both in general appearance and in the form and border of its leaves to be the more nearly related to *Inophloea*, without in any way bridging over the gap or invalidating the latter's claim to recognition as a subgenus. My conception of the natural relationship of these groups could be represented thus:



MUSCI ACROCARPI BOREALI-AMERICANI

Nos. 276-300

Prof. Holzinger's exsiccati continue the high standard set in the earlier fascicles. This fascicle contains six species from the mountains of Colorado, including *Aulacomnium papillosum* (C. M.) Jaeg. and *Grimmia incurvata* Schwaegr. Coll. H. S. Jewett.

Eight from Montana, Coll. R. S. Williams, including *Roellia lucida* (E. G. Britton) Kindb., *Bryum capitellatum* C. M. & Kindb., *Grimmia*

4. Flora **70**; 404 C. M. had used some of his sectional names as substitutes for the current group-names for a number of years prior to this publication.

5. Engler und Prantl, l. c., p. 181, f. 1894.

Brittoniae R. S. Williams, from the type station and *Mniobryum atropupureum* (Wahlenb.) Hag.

Three from California, Coll. Kingman, including *Tortula brevipes* (Lesq.) Broth. and *Orthotrichum Bolanderi* Sulliv.

Also *Grimmia Dupreti* Theriot from type station, Coll. Dupret, and other numbers of nearly equal interest.

A. J. Grout.

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Mrs. Elizabeth M. Dunham, 324 Central Street, Auburndale, Mass., *Leucodon brachypus* Brid. from New Brunswick, *Anomodon attenuatus* (Schreb.) Hueb., and *Trematodon ambiguus* (Hedw.) Hornsch. from the Rangely Lakes.

Mrs. Hugh M. Smith, 78 Orange Street, Brooklyn, N. Y. *Campothecium pinnatifidum* (Sull. & Lesq.) Jaegr. collected Dr. E. A. Mearns, Wyoming. *Weissia curvirostre* C. Müll. var. *commutata* Dixon collected Rev. P. G. M. Rhodes, Wales.

Prof. H. A. Green, Tryon, North Carolina. *Hypnum imponens* Hedw.

Mr. George M. Pendleton, Sisson, Siskiyou Co., California. *Acolium tympanellum* (Ach.) DeNot.; *Rhizocarpon petraeum grande* (Floerke) Fink; *R. oidealeum* (Tuck.) Fink; *R. bolanderi* (Tuck.) Herre, all collected in California.

Mr. George L. Kirk, Rutland, Vermont. *Biatora globifera* (Ach.) Fr.; *Stereocaulon denudatum* Floerke, collected in Vermont.

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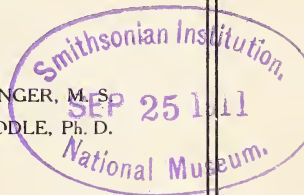
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THE BRYOLOGIST

VOL. XIV

SEPTEMBER 1911

No. 5

SOME STAGES IN THE DEVELOPMENT OF *PELLIA* *EPIPHYLLA*.

(CONTINUED)

HELEN E. GREENWOOD.

On May 17 the former collecting ground was returned to. By this time the water of the river had receded several feet and grass and weeds had grown up on the bank to such an extent that it was difficult to find any *Pellia*, where earlier the bank had been covered for several feet with nothing else. The protective covering of the taller plants made the *Pellia* thalli so delicate and tender that they withered almost before they could be put into the fixing solution, which was done as speedily as possible. Since the last collection, the plants showed a considerable increase in size and the antheridial dots were more numerous and more prominent. They were situated all the way from the middle of the thallus nearly to the tip where they were clustered, showing a tendency to slant toward the growing point. On the drier parts of the bank the plants were a pale, yellowish green, reddish purple in the middle. Those in the moister situations were of a much brighter green, of an even color throughout and were more fleshy in structure. Sections through this material showed antheridia that seemed to be fully matured, the several stalk cells and a great number of sperm cells being similar to Fig. 15.

May 24 another locality was visited and *Pellia epiphylla* was found growing with great luxuriance on a moist shaded bank. The same difference in structure and appearance between the plants growing in the drier and moister situations was noted. The microtome sections showed about the same stages of antheridial development as before.

On May 29, the next collecting date, my notes only record the fact that the old brown plants show plainly in contrast to the new green shoots. Sections through this material show earlier stages of the antheridia than in the preceding. This is accounted for by the fact that this was collected from a drier location, while that of May 24 came from a much more moist situation.

The material collected June 7 showed nothing new or different.

Sections made from plants collected on June 14, 1909, showed the same well formed antheridia but material gathered on the same date a year later, June 14, 1910, brought out some interesting comparisons and also for the first time, showed the presence of archegonia. On this latter date two sets of plants were gathered which were growing

very close together; one from the bank of a brook flowing with a fairly rapid stream thus keeping the plants always very moist; the other collected a few rods away from a shallow ditch beside the road leading down over this brook. Here the soil to outward appearances seemed dry and the plants were small and in every way apparently much less developed than the more luxuriant ones by the edge of the brook.

Such a difference there proved to be as can be seen from an examination of the accompanying figures. Figs. 25, 26, 27b represent longitudinal sections through the tip of the thallus from plants gathered on the seemingly dry soil of the roadside ditch. Figs. 25 and 30 show the earliest stages of the archegonia, the superficial cells just pushing out beside the growing point. Fig. 16a is the one-celled stage and fig. 16b shows a young archegonium which has divided to form a basal cell and the archegonium mother cell. The presence of the two nuclei indicates that a new cellwall was about to be formed thus dividing the archegonium mother cell into two cells by means of a vertical wall. Fig. 27b is a more advanced stage. Here the involucre which develops as soon as the archegonia appear begins to show and the archegonia are more advanced. In this illustration the central cell is seen to have been differentiated from the outer cells forming the wall of the archegonium. Fig. 28 represents the most advanced specimens of this material; in this the central cell has divided into two parts, an upper one, which by division will form the neck canal cells, and the lower, which will divide into the egg cell and the ventral canal cell. In contrast to this material that gathered by the brookside presented the greatest variety of stages, from the earlier ones (Fig. 18) in which the archegonium mother cell has undergone its first division into two cells, through those in which the central cell has been differentiated from the outer cell (figs. 19 and 20, to fig. 24) showing a full grown archegonium with sixteen canal cells. An average section through this material is shown in Fig. 27a. Here many of the archegonia seem to be fully grown and the protecting envelope above and below has reached its full development. A comparison of these figures is a conclusive proof of the statement made earlier in the paper that plants growing in most situations are much farther advanced at the same season than those of a drier habitat.

On June 20 the original collecting ground was returned to. Here unfavorable conditions due to the receding of the water and a thick growth of weeds and small shrubs had greatly reduced the *Pellia* colony and had apparently made the plants somewhat backward as they showed no advancement over those gathered from another locality on June 14. Sections of this material show exactly the same stages as those figured for that date. The archegonia are of varying stages, but have on the whole more of the later than the earlier ones.

The antheridia appear much the same as on the earlier dates, the antherozoids not having been shed.

Material collected June 25 showed antherozoids still unshed and new antheridia forming near the tip. No archegonia in any stage were found in this material.

June 28 found the plants in much the same condition as before. The archegonia show no special advance and the antherozoids still seem to be unshed. Only the involucre seem to have made any advance in size.

On July 4, the plants collected were very refractory, drying and curling up to such an extent that no really satisfactory sections could be obtained. Antherozoids were still unshed and archegonia seemed to be mature but no signs of a fertilized egg cell could be discovered.

On July 10 the material collected furnished much of interest and a great variety of stages from the one-celled stage of the archegonium to the young embryo, figs. 30a and 31a. One section resembled fig. 27a collected June 10. Another showed that fertilization had already taken place, the egg cell having divided to form a several-celled embryo. A corresponding growth had taken place in the walls of the venter. This new growth had proceeded far enough so that the young embryo under the well developed involucre (which was still lifted up) was visible to the naked eye.

Sections through material gathered July 18, fig. 32 showed the embryos to be much larger, having by this time developed into a many celled, somewhat-pear shaped body. On some plants the involucre were wide open. on others tightly closed. These plants were taken from soil that was saturated with water. As was to be expected from former observations, the plants were of large size and the few that were fruiting were advanced in development. But so large a proportion of the plants were sterile that it was difficult to find enough good material for the fixing solution.

The plants collected on July 26 again showed great diversity of development, some being very immature with unfertilized archegonia, others being sterile, others of an early stage after fertilization (fig. 34), others showing more advanced stages after fertilization (Fig. 33). The most advanced stage found among these sections is represented in Fig. 35. Here the embryo shows some advance over that gathered July 18, for it is larger in every way, and the walls of the venter have increased considerably. A protracted period of dry weather possibly had checked the growth of the plants.

Of the eleven collections made in August only three showed any marked development. Plants collected August 2 showed exactly the same stages as are illustrated in fig. 35. At this season the rhizoids have become so thick and the plants are so closely attached to the soil that more time and patience than ever is needed to clean them

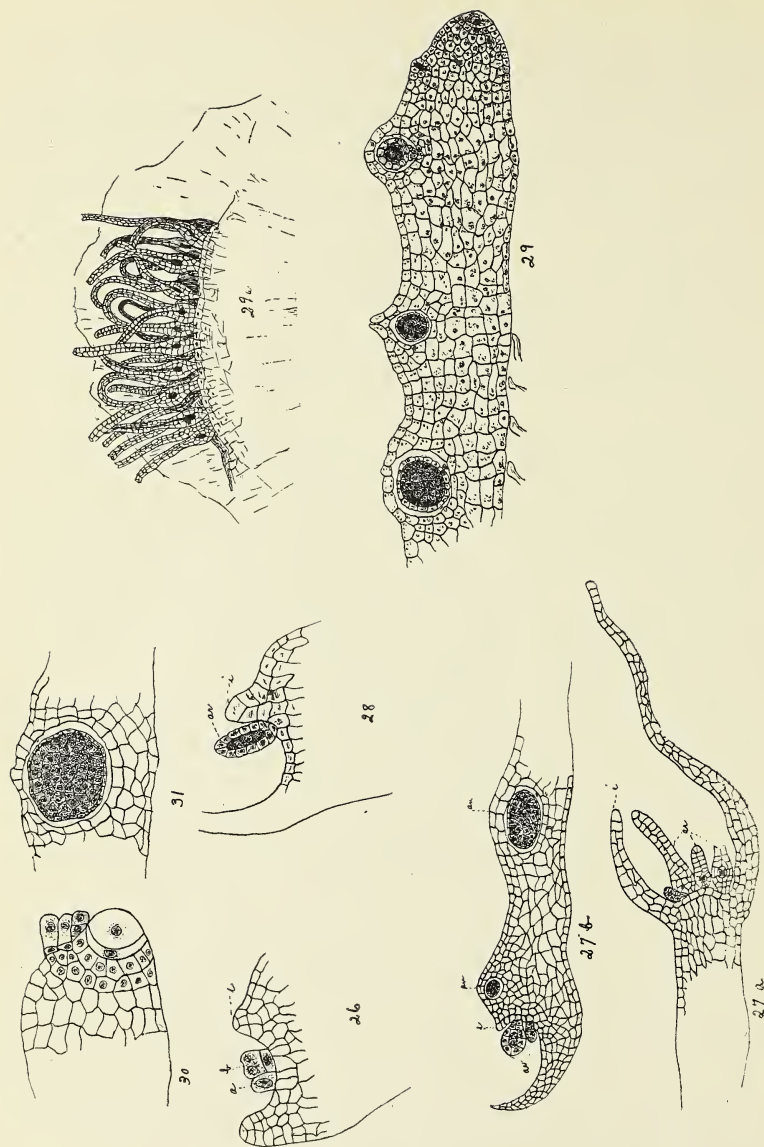


PLATE X
EXPLANATION OF PLATE X.

- Fig. 26. Vertical section through tip of thallus $\times 233$, coll. June 14.
i—beginning of involucre. a & b—2 early stages of archegonia.
Fig. 27b. Long. section through thallus $\times 55$. Collected on fairly
dry soil, June 14.

sufficiently for the fixing solution. The involucre for the most part are tightly closed over the young embryos, but as soon as they are put into the liquid they lift up enough to form a bubble which prevents fixation. This makes very careful trimming necessary for this part of the plant.

Much of the material collected Aug. 6 closely resembled that gathered on Aug. 2 and July 26, shown in fig. 35, but the more advanced stages now show a decided development. Fig. 36 shows that the cells in the young embryo have begun to differentiate into the archesporial cells and around the outside of these are two definite rows of cells which will form the capsule wall. The archesporial cells show plainly for the protoplasm is denser and they take a deeper stain. Development in the walls of the venter now seems to have come to an end.

Some of the sections from material collected Aug. 9 seem to show an increase in the size of the embryo, it being somewhat longer and showing a slight tendency toward a differentiation in shape between the rectangular and more compact cells in the region of the seta and those lower down in the region of the foot, the latter being longer and looser in structure.

Several sections of material collected Aug. 15 indicate that there are two kinds of cells in the archesporial region, those more nearly round or rectangular with large nuclei and which will become spore mother cells and others somewhat elongated which will develop into elaters (fig. 37).

[TO BE CONTINUED]

i—involucre. ar—archegonia. an—antheridia.

Fig. 27a. Long. section through thallus $\times 55$. Growing on very wet soil June 14. i—involucre. ar—archegonia.

Fig. 28. Another part of long. section through end of thallus represented in fig. 26 $\times 233$.

Fig. 29a. Involucre and most of surrounding tissues dissected away to show grouping of archegonia near end of thallus $\times 40$.

Coll. Aug. 17.

Fig. 29. Median. longitudinal section through growing point of thallus, $\times 55$. coll. Apr. 21. Shows 4 stages of antheridia from immature one nearest tip to one fully developed farthest from tip.

Fig. 30. Median longitudinal section through growing point of thallus $\times 233$. June 14. Same as fig. 25, only more highly magnified.

Fig. 31. Longitudinal section through antheridium in another part of same thallus $\times 233$. June 14.

(Fig. 32 of Miss Greenwood is omitted).

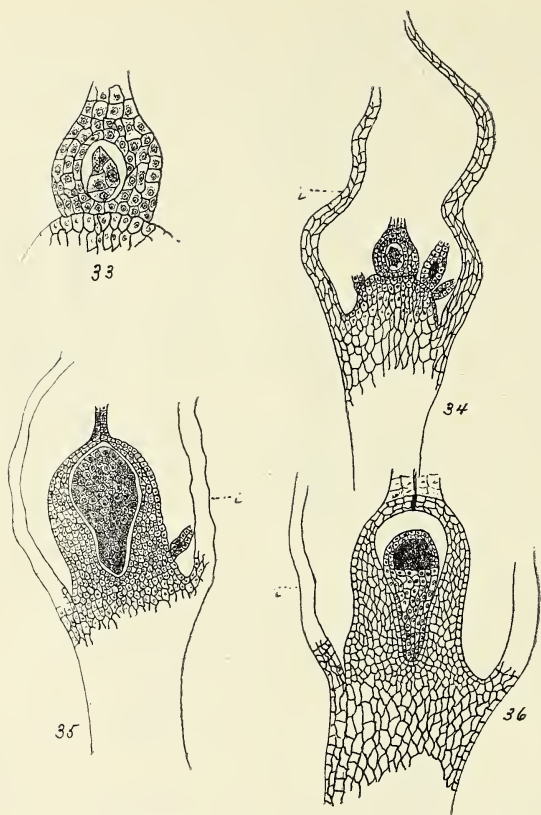


PLATE XI

EXPLANATION OF PLATE XI.

STAGES IN THE DEVELOPMENT OF EMBRYO

- Fig. 33. Median long. section of young embryo $\times 233$. July 26.
From Fig. 34.
- Fig. 34. Median long. section through end of thallus showing old archegonia and one young embryo $\times 55$. July 26.
- Fig. 35. Vertical median section through young embryo $\times 60$. July 26. Shows great increase in number of cells in wall of venter. Withered neck of archegonium still persists. Old archegonium left, pushed up on sides of wall of venter.
- Fig. 36. Median longitudinal section through young embryo $\times 55$. Aug. 6. Archesporial cells differentiated from those forming capsule wall and seta, venter shows no further growth.

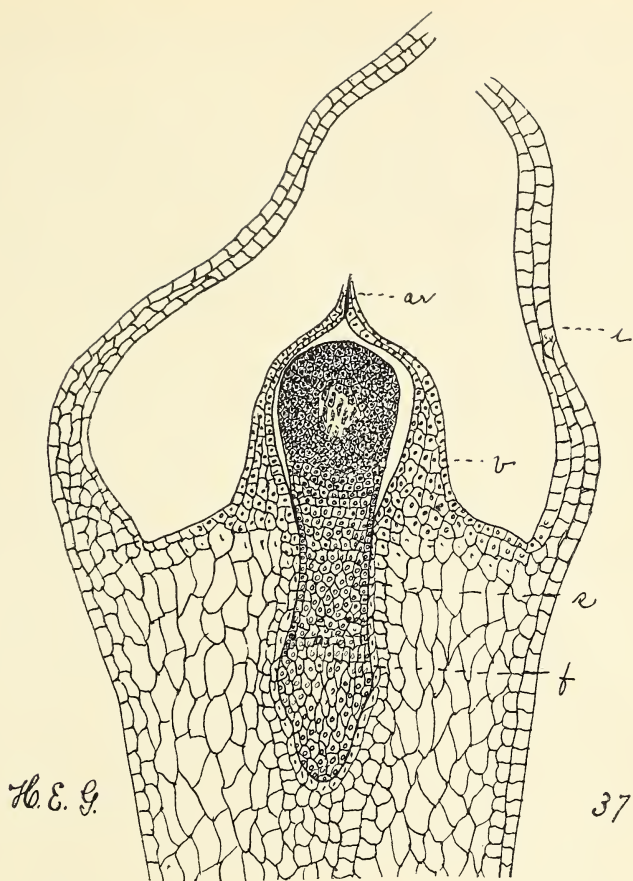


PLATE XII

EXPLANATION OF PLATE XII

Fig. 37. Median longitudinal section through young sporogonium $\times 110$. Coll. Aug. 15. Archesprial cells begin to differentiate into spore mother cells and those which will form elaters.

f—foot.

s—seta.

v—calyptra.

ar—withered neck of old archegonium.

i—involucre.

NOTES ON NORTH AMERICAN HEPATICAE. II.

ALEXANDER W. EVANS.

In the first paper of this series, published in the *BRYOLOGIST* for March, 1910, attention is called to ten species of Hepaticae of more or less interest. In the present paper ten additional species are discussed, the most important being *Neesiella pilosa*, the relationships of which are still incompletely understood. The three species of *Lejeuneae* from Florida have already been reported upon in the writer's recent paper on the Hepaticae of the Bahama Islands.¹ It seems advisable, however, to mention them again because they represent distinct additions to the flora of the United States.

RICCIA CALIFORNICA Aust.

Collected in August, 1908, on earth, at Departure Bay, Vancouver Island, by J. Macoun (*No. 5*); also, at Spence's Bridge, British Columbia, in June, 1910, by A. Brinkman (*No. 240*). The species has not before been found beyond the boundaries of California. Its discovery in British Columbia shows that it may be expected to occur in Washington and Oregon. A complete description of the plant, with figures, is given in Howe's "Hepaticae and Anthocerotae of California."

NEESIELLA PILOSA (Hornem.) Schiffn. *Hedwigia* **47**: 314. 1908.

Marchantia pilosa Hornem. *Fl. Dan.* **8**: 7. *pl.* 1426. 1810. *Duvalia pilosa* Lindb. *Not. F. et Fl. Fenn.* **9**: 280. 1868. *Grimaldia pilosa* Lindb. *Musc. Scand.* **1**. 1879.

Collected in July, 1907, on Corbeaux Ridge, Bic, Rimouski County, Quebec, by J. F. Collins (*No. 4877a*). The first and only other American record for the species was made by C. Jensen from specimens found by N. Hartz at Scoresby Sound, Greenland.² Even in Europe it is very rare and is known from only a few localities in Norway, Sweden, Finland, and Spitzbergen. It has also been reported from Siberia. According to Stephani³ and C. Müller *N. pilosa* cannot be specifically separated from *Grimaldia carnica* Massal.,⁴ an alpine plant known from about half a dozen stations in Austria and northern Italy. Schiffner maintains, however, that the two species are still too incompletely known to justify this extreme view and thinks that, provisionally at least, they ought to be kept apart.

Schiffner⁵ and C. Müller⁶ have described *Neesiella pilosa* so fully and so clearly that only its more striking features will be mentioned

1. Bull. Torrey Club **38**: 205-222. *pl.* 9, 10. 1911.
2. Medd. om Gronl. **15**: 369. 1898.
3. Sp. Hepat. **1**: 91. 1898.
4. Ann. dell'Ist. Bot. di Roma **2**: 66. *pl.* 9, *f.* 7. 1886.
5. Morphologische und biologische Untersuchungen über die Gattungen *Grimaldia* und *Neesiella*. *Hedwigia* **47**: 306-320. *pl.* 8. 1908.
6. Rabenhorst's Kryptogamen-Flora **6**: 264. *f.* 163. 1907.

here. The thallus is green on the plane upper surface and reddish brown below, the pigmented portion sometimes extending to the upper surface and forming a narrow band along the margin. The bulk of the thallus is made up of loose photosynthetic tissue in which the large air-chambers are arranged in several layers separated from one another by plates of cells. The chambers are bounded above by a thin-walled epidermis through which the boundaries of the chambers are clearly visible. Sometimes the epidermal cells develop small trigones but they are more frequently thin-walled throughout. The postical scales, which are large and imbricated, are lunulate in outline. Except for their hyaline margins they are deeply pigmented with purplish red. Each scale bears one or two appendages, composed of somewhat larger cells than the scale itself and soon becoming bleached out and transparent. The appendages are lanceolate and usually entire, although in some cases one or more minute and irregular teeth are present. The stalk of the carpocephalum bears a cluster of lanceolate scales at the base and also at the apex, similar to the appendages just described but larger.

The spores in the Bic specimens, which are apparently not quite mature, measure about $55\ \mu$ in diameter and are yellowish brown. The spherical face presents the appearance of being coarsely tuberculate when seen in profile but is really covered over with low ridge-across which form a more or less regular reticulum with about seven meshes the diameter of the spore. Where the spherical face meets the three triangular faces the ridges form a narrow wavy border about $5\ \mu$ wide. The triangular faces are not very clearly defined and bear a few irregular ridges which do not form a network. Each face, however, usually bears a ridge parallel to the border, and the three ridges by their coalescence form a second border much less regular and definite than the first. The elaters are about $10\ \mu$ in diameter and are bluntly pointed at each end. Each one usually shows three brown spirals, which are quite distinct from one another.

3. *NEESIELLA RUPESTRIS* (Nees) Schiffn. in Engler & Prantl, Nat. Pflanzenfam **1**³: 32. f. 17, G-K (after Bischoff). 1893.
Duvalia rupestris Nees, Magaz. d. Berlin. Ges. Naturf. Fr. **8**: 271. pl. 10. 1817. *Grimaldia rupestris* Lindenb. Nova Acta Acad. Caes. Leop. Carol. **14** (suppl.): 108. 1829.

Collected in May, 1903, on soil in cavities of a limestone ledge, at Lemont, Illinois, by E. J. Hill. The distribution of this species in North America is still very incompletely known. Apparently the first record of its occurrence was made in 1866 by Peck,¹ who cited specimens collected by E. G. Pickett at Havana, Schuyler County,

1. 19th Ann. Rept. Reg. Univ. State of N. Y. 65. 1866.

New York. The following stations may also be quoted from the literature: Mt. Albert, Gaspé County, Quebec (J. A. Allen); Belleville and Ottawa, Ontario (J. Macoun); Springfield, Ohio (Spence). In Europe it is known from various localities in Germany, Austria, Switzerland, and Italy, and it has also been reported from Japan. It seems to be largely if not wholly confined to calcareous regions.

The close relationship between *N. rupestris* and the preceding species has recently been emphasized by Schiffner. Both gametophyte and sporophyte, however, yield a few differential characters of importance. The thallus of *N. rupestris*, for example, is even looser in texture than that of *N. pilosa* and the delicate epidermis tends to break down completely and to leave the air-chambers exposed, very much as in *Ricciella crystallina*. The postical scales, moreover, are small and inconspicuous, and the lanceolate scales on the stalk of the carpocephalum are very sparingly developed. The spores are very much like those of *N. pilosa* and average about $60\ \mu$ in diameter when well developed. The reticulations on the spherical face, however, are usually less distinct and fewer, measuring perhaps five across the face of the spore; on the triangular faces there are sometimes two ridges between the border and the apex of the spore, instead of one as in *N. pilosa*, but these ridges are often very indistinct and irregular. The elaters measure about $9\ \mu$ in diameter, and the two or three spirals are more or less united to one another, an important peculiarity first noted by Schiffner.¹

The genus *Neesiella* is so closely allied to *Grimaldia* that many students do not consider them distinct and include the species of *Neesiella* under *Grimaldia*. Schiffner has shown, in fact, that the differential characters drawn from the carpocephala do not deserve the emphasis which has been placed upon them and that the only sharp distinctions between the genera are those derived from the vegetative structure of the thallus. At the same time he considers these differences sufficient to keep the genera apart. In *Neesiella*, as he points out, the basal tissue of the thallus is thin and the much more abundant photosynthetic tissue is exceedingly loose in texture, as already noted under *N. pilosa*. This condition is due to the fact that the air-chambers increase in size as the thallus matures without becoming subdivided to any great extent by secondary cell-layers which grow out from those originally laid down. In *Grimaldia*, on the other hand, the basal tissue of the thallus is thicker and the relatively less abundant photosynthetic tissue is much denser, the air spaces being very small, a condition produced by the abundant development of secondary cell-layers within the original chambers. On account of these differences in development each superficial chamber in *Neesiella* is

1. Oesterr. Bot. Zeitschr. 56: 24. 1906.

provided with a pore even at maturity, and the boundaries of the chambers remain distinct. In *Grimaldia*, however, many of the superficial air-spaces have no pores in the mature thallus and the boundaries of the spaces are indefinite.

4. *METZGERIA DICHOTOMA* (Swartz) Nees.

The remarkable gemmae of this species, characterized by the regular presence of two apical cells, were recently described and figured by the writer from Porto Rican specimens collected by E. G. Britton and D. W. Marble on Mt. Morales, near Utuado (*No. 498*).¹ The determination of these specimens was considered at the time a little doubtful because no gemmiparous material from Jamaica, the type locality of *M. dichotoma*, had been available for comparison. During the past summer, however, through the kindness of Mr. A. Gepp, the writer was allowed to examine a number of Hepaticae in the herbarium of the British Museum at South Kensington, and among these was a gemmiparous specimen of the species in question collected in Jamaica by Wilson (*No. 817*). Since the gemmae on this specimen agree closely with those on the Porto Rican material the determination of the latter as *M. dichotoma* may now be considered as definitely established.

5. *METZGERIA FRUTICULOSA* (Dicks.) Evans, *Ann. Bot.* **24**: 296. *f. 16*. 1910.

In the writer's recent account of this interesting species only one American locality could be quoted, namely: near Aberdeen, Washington, A. S. Foster (*No. 944*). In the herbarium of the British Museum a second American specimen is preserved, collected by W. Lobb in Oregon, no more definite description of the station being given. In all probability the species has a wide distribution in the United States and Canada.

6. *SCAPANIA SPITZBERGENSIS* (Lindb.) C. Müll. *Frib. Bull. Herb. Boissier II.* **1**: 607. 1901. *Nova Acta Acad. Caes. Leop. Carol.* **83**: 177. *pl. 24*. 1905. *Martinellia spitzbergensis* Lindb. *Kongl. Sv. Vet. Akad. Handl.* **23**⁵: 31. 1889.

Collected in 1896, on the Nugsuak Peninsula, Greenland, by the Cornell Party with the Peary Expedition. An arctic species, new to North America. Known also from Spitzbergen, the type locality, and from Siberia. The determination of the Greenland specimens has been confirmed by Müller. *S. spitzbergensis* bears a superficial resemblance to large forms of *S. nemorosa* (L.) Dumort., with which it was at first confused. Its leaves, however, differ in having strongly convex and reniform dorsal lobes and arched keels, each bearing a broad, spinose-dentate wing. In *S. nemorosa*, the dorsal lobes are plane or slightly convex and broadly ovate in outline, while the keel

1. *Ann. Bot.* **24**: 288. *f. 13*. 1910.

is usually straight or nearly so and bears a narrow wing with few or no teeth. The cuticle in the Greenland plants is strikingly verruculose.

7. **Lopholejeunea atroviridis** (Spruce) comb. nov. *Lejeunea* (*Acrolejeunea*) *atroviridis* Spruce, Jour. Linn. Soc. Bot. **30**: 335. *pl.* 20, *f.* 5-10. 1894.

In a recent discussion of the West Indian species of *Ptychocoleus* (*Acrolejeunea*)¹ the writer calls attention to the fact that certain characters of the present species are aberrant to that genus and that its systematic position is perhaps elsewhere. A study of the type material in the British Museum shows that this view is correct and that the plant is really a member of the genus *Lopholejeunea*, as above noted. It should be mentioned, however, that Spruce himself at first referred the species to *Lopholejeunea*, transferring it to *Acrolejeunea* in his published paper. The perianth in *L. atroviridis* is four-keeled and the keels bear narrow denticulate wings. The perichaetial bracts are likewise sparingly toothed. In general habit the plant resembles *L. Muelleriana* but the lobules are more like those of *L. Sagraeana*. The species grows on rocks, and the type locality is Richmond Valley, St. Vincent, where Elliott found it in February, 1892 (*No.* 219). He afterwards collected it at two stations on Dominica, Picard Valley (*No.* 442) and Castle Brace River (*No.* 1661). Specimens from both these stations also, determined by Stephani, are preserved in the British Museum. No other localities for the plant have been reported.

8. **CERATOLEJEUNEA INTEGRIFOLIA** Evans, Bull. Torrey Club **38**: 213. *pl.* 9, *f.* 13-19. 1911.

Collected several times by S. Rapp, near Sanford, Florida, the earliest date being April 12, 1903. Known also from three stations on the island of New Providence. Perianths not yet discovered.

9. **BRACHIOLEJEUNEA BAHAMENSIS** Evans, Bull. Torrey Club **35**: 383. *pl.* 28, *f.* 1-14. 1908.

Collected in November, 1901, on Old Rhodes Key, Florida, by J. K. Small and G. V. Nash, (*No.* 464, in part). The species is also known from various islands in the Bahamian Archipelago and from Cuba.

10. **CAUDALEJEUNEA LEHMANNIANA** (Gottsche) Evans, Bull. Torrey Club **34**: 554. *pl.* 33, *f.* 1-12. 1908.

Collected in October, 1906, in a hammock near Long Prairie, Florida, by J. K. Small and J. J. Carter (*No.* 2812). Widely distributed in tropical America.

Specimens of the three *Lejeuneae* just noted are preserved in the herbarium of the New York Botanical Garden. They increase the number of *Lejeuneae* known from Florida to twenty-seven.

YALE UNIVERSITY.

1. Bull. Torrey Club **35**: 165. 1908.

REVIEWS

ELIZABETH G. BRITTON

AFRICAN MOSSES

The Botanical collections made by Dr. Mildbraed for the German Central-African Expedition of 1907-1908 are being published in Leipsig and a separate including the mosses by V. F. Brotherus has just been received. It is part of volume 2 of Botany and contains pages 136-176 with 15 plates, including figures of 45 new species. The collections contained 137 species of which 57 are described as new and one new genus *Leptodontiopsis*. Of ubiquitous and common mosses the following are familiar: *Ceratodon purpureus*, *Hedwigia albicans*, *Stereodon cupressiformis* and 12 others from the higher mountains are common in the colder regions of the northern hemisphere. But most of them are quite unknown. Besides the mosses 233 new species of flowering plants and 49 hepatics have been described, also many new birds, reptiles and mammals. The expedition was led by Adolf Friedrich, Duke of Mecklenburg, whose very interesting volume entitled "In the Heart of Africa" has just been translated into English. It has a great many illustrations and states that 3466 botanical specimens were collected which have been deposited in the Royal Museum at Berlin and published by the Royal Prussian Academy of Sciences.

New York Botanical Garden.

EXOTIC MOSSES

Part 2 of Die Auss-Europäischen Laubmoose by Dr. George Roth* was received on January 28th, 1911. It contains pp. 97-192 with plates 9-16, including the completion of the Key to *Archidium* with descriptions and drawings of 25 species, all but one from original specimens, but of these three are American: *A. ohioense*,¹ *A. Ravenelii* and *A. longifolium*, and of the latter the fruit was not seen. So that as far as American specimens are concerned we are not much better off than we were before.

The cleistocarpous mosses are next described under the 8 families where they have been placed by recent authors. Of *Bruchia* he lists and figures 28 species, all but 10 of these from original specimens, but again the treatment of three American species is most unsatisfactory; 9 of the drawings are not from original specimens, and he perpetuates the old mistake of confusing *B. brevipes* Hook. (*B. elegans* Hsch.) from Cape of Good Hope with *B. Drummondii* Hpe. (*B. brevipes* Hook. & Wils.) and figuring the American specimens instead of the African under both names, in neither case from type specimens and without indicating any specific differences between them.

Of *Pleuridium* there are 28 species described, and all but 10 from original specimens, but of these *P. Bolanderi* is from Chicago, and *P. Ravenelii* from Louisiana. *Astomum* is not completed in this fascicle, 18 species are described but none are figured. Thus far it does not look as if much new light were thrown on North American species, as a work of this magnitude and celerity cannot be very critical.

New York Botanical Garden.

*Part I was reviewed in the BRYOLOGIST, March, 1911.

POLYTRICHUM APPROACHING P. SMITHIAE

ELIZABETH M. DUNHAM

As so many members of the Moss Society were especially interested in the *Polytrichum* approaching *P. Smithiae* Grout which was recently "offered," the writer has obtained permission to give to all the benefit of the notes made by Prof. J. Franklin Collins after a careful examination of the material sent to him for determination.

Prof. Collins wrote as follows :

"Judging from a comparison with J. M. Holzinger's Musci Acrocarpi Boreali-Americani No. 50 which was distributed as 'Part of type' (of *Polytrichum Smithiae*), and from the description and figures of that species given by A. J. Grout in the BRYOLOGIST 6: 41. May, 1903), I should say, in general, that your No. 807 was pretty good *P. Smithiae* in its sporophytic characters, but depauperate *P. Ohioense* in its gametophytic characters. Your specimens appear to differ from *P. Smithiae* principally (1) in lacking the slender stems with closely appressed leaves (see fig. 10, plate VIII, l. c.) which so strongly suggest *P. strictum*, (2) in having 38 to 40 lamellae instead of about 32, (3) in leaves reaching a length of 6.5 mm. (excluding the sheath), widely spreading or slightly recurved when moist, loosely appressed and with spreading tips when dry, much after the style of fig. 2, plate VIII (l. c.).

Renauld and Cardot in the Revue Bryologique (12: 12, 1885) give the lamellae of *P. Ohioense* as 40 to 50, 5 to 7 cells high. Grout in the BRYOLOGIST (l. c.) says of *P. Smithiae* 'lamellae about 32, four to six cells high.' Your specimens, so far as I have examined them, show 38 to 40 lamellae, five cells high. Thus in the number of lamellae, as well as in other characters mentioned above, your specimens come nearer to *P. Ohioense* than to *P. Smithiae*.

In measurements of length only of both sporophyte and gametophyte your plants fall well within the measurements given for *P. Smithiae* (l. c.), as may be seen from the following summary of measurements made from 47 of your specimens. Shortest gametophyte 9 mm., longest 29 mm.; of these there were 7 between 9 and 13 mm.,

22 between 14 and 18 mm., 3 between 19 and 21 mm., 12 between 22 and 25 mm. and 3 between 26 and 29 mm. Shortest sporophyte 11 mm., longest 30 mm.; of these there were 2 between 11 and 15 mm., 13 between 16 and 21 mm., 25 between 22 and 25 mm., and 7 between 26 and 30 mm. Capsule length, 3 from 2, 8 to 3 mm., and 44 between 3 and 4 mm. The longest deoperculate capsule measures a scant 4 mm.

A CORRECTION

REGINALD HEBER HOWE, JR.

In my list of the "Lichens of Mount Monadnock, New Hampshire," (Amer. Nat. 40: 664. 1906) I included no. 46 *Ephebe solida* Born. Before publishing the list, as stated in the preface, I had forwarded the "Cladonias, and. . . several other specimens" to Prof. Bruce Fink for determination, as I felt myself incompetent to determine them. In a letter dated April 6, 1906, Prof. Fink wrote me concerning this specimen: "Possibly *Ephebe solida*, but probably an alga. Look for fungal hyphae with oil immersion lens." Not having such a lens, and being only moderately versed in plant histology, I turned naturally to my former college teacher, Dr. Herbert M. Richards, and asked him if he would be good enough to examine the material for fungal hyphae, the very presence of which it appeared to me would settle the plant as *Ephebe solida*. Under date of May 30, 1906, Dr. Richards wrote me "On examining the specimen of the questionable *Ephebe* from Mt. Monadnock with a 1-16 Leitz I could certainly detect the presence of a septate mycelium covering the *Stigonema*. I suppose, therefore, it must be a lichen." On this entirely insufficient evidence I included the plant in my list, having made sure in Tuckerman that the plant had been previously collected in this part of New England. In my statement "determined through the kindness of Dr. Richards" I especially used the word "through" rather than "by" to relieve Dr. Richards of any technical responsibility in determining lichen species.

Now that five years have passed, and I have largely confined my lichen studies and responsibilities to the family *Usneaceae*, I have felt doubtful of this determination, and have been desirous of setting the matter right, especially as I feared that perhaps I had involved Dr. Richards in a wholly unconscious way. Consequently some weeks ago I sent the material to Dr. Lincoln W. Riddle for his opinion; he kindly reports as follows under date of March 17, 1911. "I have now studied your '*Ephebe*' as carefully as my time would permit. I have no material of *E. solida* for comparison, but feel quite sure that this is not that species. In fact, I doubt if it is an *Ephebe* at all."

"There is considerable discrepancy between Tuckerman's description of *E. solida* and Bornet's original description. Your material agrees superficially with Tuckerman's description, but Bornet says 'Les filaments sont assez gros, *peu* ramifiés.' (your material is much branched) then 'les cellules de leur partie intérieure sont de deux sortes : les unes sont étroites, flexueuses et rayonnantes ; les autres, très grandes, arrondies, ressemblent, sur une coupe transversale, a l'ouverture de gros vaisseaux.' I have cut sections of your material and the cells do not correspond to this description. I find that the filaments of the *Stigonema* are intertangled with fungus filaments which are, however, external and not growing through the alga as should be the case in an *Ephebe*. Further the alga is evidently not in good condition. It was undoubtedly these fungus filaments which Dr. Richards saw when he reported to you that such filaments were present. The conclusion which I have reached after studying your material and comparing it with specimens of *Ephebe pubescens* and *E. mammosum* in our herbarium, is that your specimens are *Stigonema*, rather degenerate and parasitized by some hyphomycetous fungus."

I regret very much that this erroneous record should have stood in print for nearly five years, as I realize very keenly how misleading such published data are, and moreover how common such false records are in our North American lichenological literature. In this case I have no excuses to offer, and assume the entire responsibility.

Thoreau Museum, Concord, Massachusetts.

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Prof. A. S. Foster, Pacific Beach, Chevalis Co., Wash.—*Pterygophyllum lucens* (L.) Brid. *Ulota phyllantha* Brid.

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NOVEMBER 1911

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THE BRYOLOGIST

VOL. XIV

NOVEMBER 1911

No. 6

SOME STAGES IN THE DEVELOPMENT OF PELLIA EPIPHYLLA.

(CONCLUDED)

HELEN E. GREENWOOD.

After this time collections were made Aug. 17, 18, 21 and 23, on the latter date two being made from widely separated localities. The most advanced stage of this group came from the collection of Aug. 18 (fig. 38). Here the differentiation into spore mother cells and elater forming cells has proceeded still further. These cells seem to be surrounded by a reticulated protoplasm, the network showing more or less distinctly with a fairly low power. The only difference noted in that collected on the twenty-third was that there were more loose cells in the open space within the capsule and the difference between the two kinds of cells was still more evident.

On August 28, growth was found to have gone on so rapidly that with a low power magnifier the sporogonium seemed to be fully developed into a stem and well rounded out capsule. Vertical sections (fig. 39) through this material show that the archesporial division has been completed, the spore mother cells with their large nuclei are separated from each other and from the much elongated young elaters with their correspondingly small nuclei. The difference between the stem and the foot is now well defined, the latter forming a pointed cap which overlaps the base of the seta. The spore mother cells are in general spherical but a few of the more advanced ones show a tendency to become lobed.

Vertical sections through sporogonia collected September 3 show a decided development in the spore mother cells over those collected Aug. 28 (fig. 40). They have all become distinctly lobed (fig. 41) but are still much scattered, occupying comparatively little space within the capsule. The elaters on the other hand, have much the same appearance, still being distinctly nucleate with no signs of spiral thickenings on the wall.

Sections through capsules collected on Sept. 16 show the lobed spore mother cells to be much crowded and these now occupy a proportionately large space in comparison to the elaters which are still nucleate.

Material collected Sept. 25 and Oct. 18 presents very similar stages of development (fig. 43). In both, the spore mother cells have become conspicuously four-lobed, but these four lobes diverge

from one another in such a way that in a thin section we seldom see the four divisions in one plane and so they appear instead to be three lobed. In the former, the spiral thickenings in the walls of the elaters are very faint but in the latter these are plainly marked and the contrast in size between the fixed and free elaters is evident, the former being much larger.

Before passing on to the later stages, attention should be called to the flattened cells arranged in longitudinal rows in the stems of the sporogonia (figs. 39, 40, 41, 43, 44) so characteristic of *Pellia epiphylla*.

No further collecting was done until Nov. 21. The weather had been sufficiently mild to melt the two light snows that had fallen earlier in the month and the plants did not seem to be at all frozen. The involucre fitted so tightly over the little cavities in which the capsules lay that it was difficult to tell at the first glance whether there was a capsule enclosed or not. The capsules were very variable in size and on the whole seemed smaller than those collected in the latter part of September and October. No four-lobed spore mother cells were to be found now, but in their places were the fully formed oval spores (fig. 44). Evidently the formation of the spores from the four-lobed spore mother cells occurs in the latter part of October or the first part of November.¹

Sections through capsules collected Nov. 27 showed that not only have the spores been formed but that cell division has already begun to divide each of them into a multicellular body, i.e. the first stages in germination have already taken place (figs. 45 and 46a, b, c,) some of the spores are two celled, others four celled (46a), while others have each of the central cells divided again (46b). The walls of the spores seem to be very thin.

On the next collecting date, Dec. 29, the ground was covered with quite a thick coating of snow, so *Pellia epiphylla* could only be found in a few bare spots and then the ground was frozen so that the plants had to be scraped off with a knife. Each thallus was almost black and thin, dry and papery. The capsules were so shrunken down and hidden under the tightly closed involucre that it was necessary to look carefully to find them. The plants lay in a closed tin box over night in a fairly warm room and so lost their papery character, becoming rubbery instead. The next morning the capsules still seemed much shrunken but as soon as they were placed in the fixing solution, they expanded to their natural size. Vertical sections

1. This process of cell division has been described by Dr. Davis, as follows: (Nuclear studies in *Pellia*, B. M. Davis, Ann. of Bot. **15**:247).

“The cell wall laid down after the first mitosis separates the lobes of the spore mother cell into pairs which lie at an angle to one another, if not perpendicular * * * a cell plate appears in the equatorial region of the spindle and is then shortly replaced by a cell wall and the division of the spore mother cells is complete.”

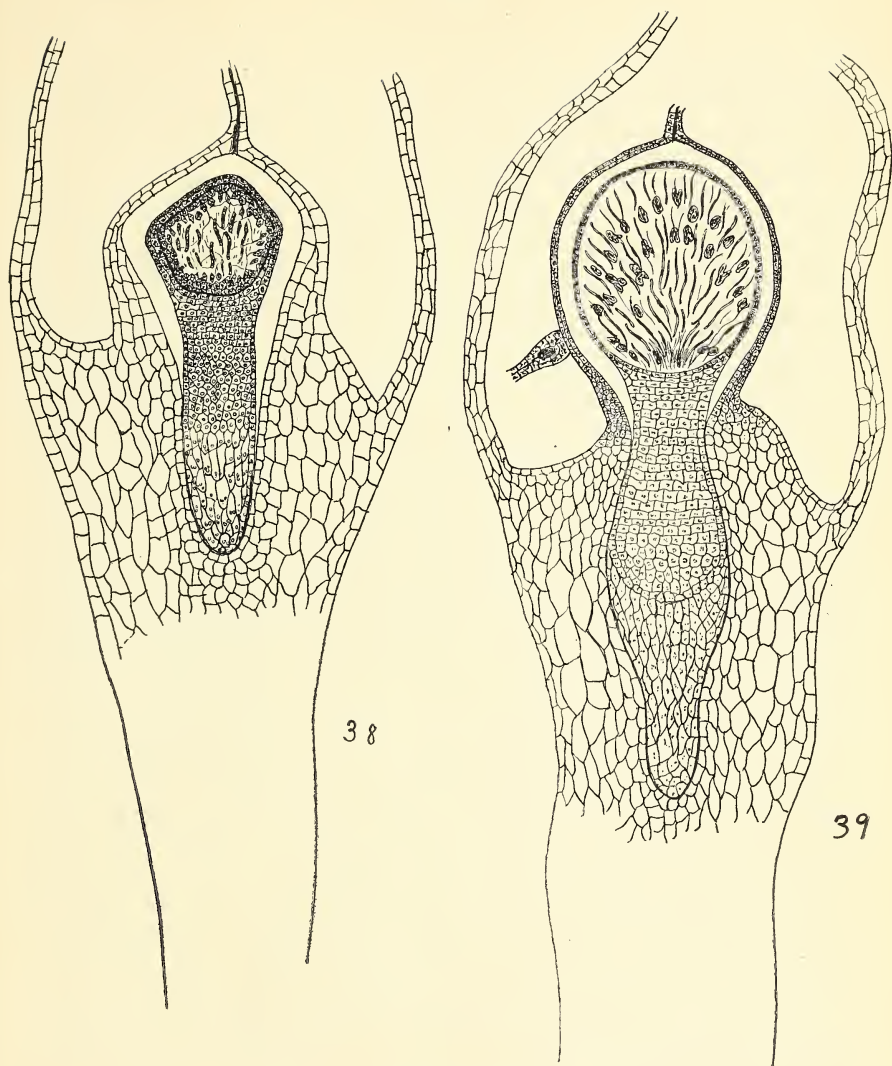


PLATE XIII

- Fig. 38. Median longitudinal section through young sporogonium $\times 75$. Aug. 18. Seta and foot have elongated and greater differentiation is seen between the two kinds of cells both in this region and in the capsule.
- Fig. 39. Median longitudinal section through young sporogonium $\times 75$. Aug. 28. Withered neck of archegonium still persists and an old undeveloped archegonium has been carried up on side of calyptra. Spore mother cells slightly lobed, nucleate elaters.

(fig. 49) showed the capsule wall to be generally two layers in thickness, the central space to be filled with the bunch of fixed elaters (which grow up from the base of the capsule), and the spores surrounded by free elaters scattered through the capsule cavity.

Weather conditions prevented any collection being made in January, but Feb. 7 found the temperature high enough, and the woods open enough for a collecting trip. The ground was quite thoroughly covered with a layer of ice and snow, but on just one tussock over the water's edge the snow had melted and the plants of *Pellia epiphylla* had softened up so that they could be easily gathered. Some of the capsules were very large and nearly pushed out from under the involucre, looking as if sufficiently encouraged by warm weather they would shed their spores very soon. Vertical sections through these capsules show the spore cavity to be much crowded with spores, the elaters being pressed into a small space (fig. 50).

The next collection was made on March 13. No change had taken place in the contents of the capsule (fig. 51). Vertical sections through the spores show almost exactly the same condition as those collected Nov. 27. The same figures (46a, b, & c.) represent these exactly. Evidently the spores are fully formed in November, and the intrasporal development so characteristic of *Pellia epiphylla* is completed by the last of November. Therefore the spores must remain in a dormant condition over winter from November until they are shed in the following April.

On April 24, the few capsules not already opened were collected. They were so sensitive to heat that as soon as they were placed in the paraffine oven and the temperature began to rise toward the melting point, the four valves split open from apex to base curving tightly back against the seta and the spores were scattered through the fluid. The sections, therefore, were very fragmentary, being composed mainly of the capsule with the tuft of fixed elaters fastened securely to it and varying amounts of spores and free elaters scattered about over the sections. None of the spores were sectioned through, only outside views being presented. The spores are oval in shape, the outer wall being marked by irregular ridges or thickenings.

This brings us back to the last of April, the point where we started, and completes the year's record of the stages of the development of *Pellia epiphylla*.

SUMMARY.

1. *Pellia epiphylla* grows in shaded locations on damp soil in swamps and bogs, on moist roadsides, or on the banks of streams.

2. The plant body is a slightly fleshy thallus, oblong, more or less sinuate, lobed or forked, the shape being modified according to the way it is crowded by other plants, an average size being from about a half an inch in width to an inch or an inch and a half in length.

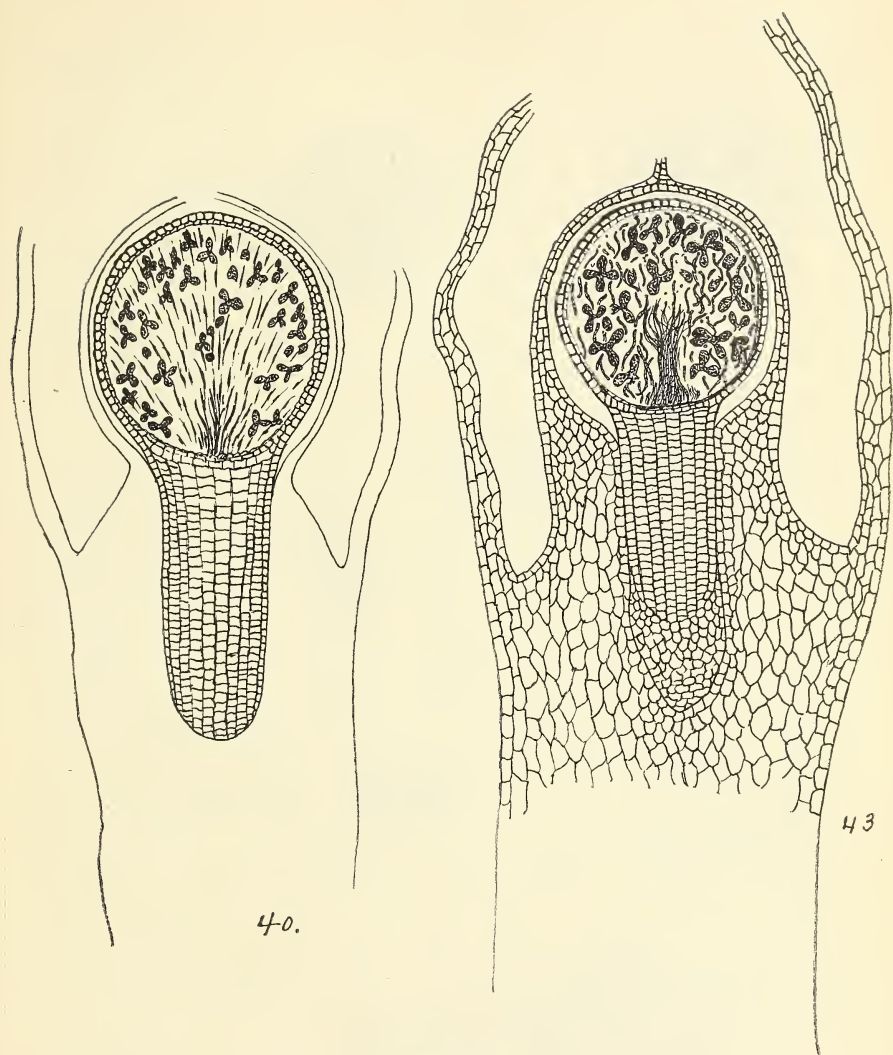


PLATE XIV

Fig. 40. Median longitudinal section of sporogonium $\times 82$. Sept. 3.
Spore mother cells all lobed, nucleate elaters.

Fig. 43. Median longitudinal section through sporogonium. Oct. 18.
 $\times 82$. Elaters now show spiral thickenings.
(Fig. 42 of Miss Greenwood is omitted).

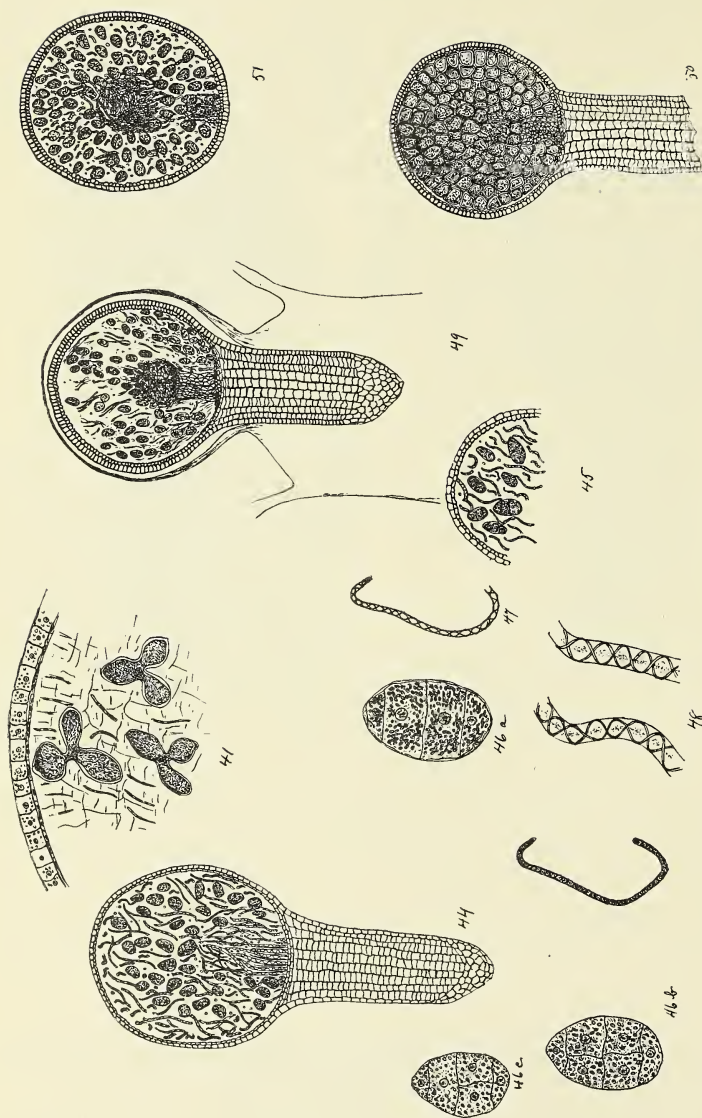


PLATE XV

3. The thallus is composed of parenchyma cells bordered by an epidermal row of cells above and below, being abundantly provided with rhizoids.

4. *Pellia epiphylla* is monoecious, the antheridia being scattered along the middle of the thallus to the tip, while the archegonia are formed just behind the growing point.

5. In this locality the spores are shed in the latter half of April.

6. The old plants then die down and new shoots immediately spring out from the edges of these plants.

7. Antheridia soon make their appearance on these new shoots. The early stages of antheridia should be looked for shortly after the middle of April.

8. The mature stages of the antheridia may be found from the last of April through May and June.

9. Archegonia may be found early in June.

10. According to observations on material collected in 1909 and 1910 fertilization does not take place until early July. As both these seasons were unusually dry, fertilization may normally occur in June, if the rainfall is heavier.

11. After fertilization the embryo grows rapidly through July and develops into a pear-shaped body.

EXPLANATION OF PLATE XV

Fig. 41. Vertical section through small portion of capsule represented in fig. 40, $\times 233$. Capsule wall two layered. Lobed spore mother cells with nucleus near center, elaters still in nucleate stage.

Fig. 44. Median longitudinal section through sporogonium. Coll. Nov. 21. $\times 55$.

Fig. 45. Portion of vertical section through capsule. Coll. Nov. 27. $\times 55$.

Fig. 46 a, b, c. Vertical sections through spores from capsules. Coll. Nov. 27. $\times 330$. Spores have already begun to divide into a multicellular body, i. e., the development of the gametophyte has already begun. Vertical sections through spores collected Mar. 13, have the same appearance.

Fig. 47. Single elater $\times 55$.

Fig. 48. Portions of elaters $\times 330$.

Fig. 49. Median longitudinal section through sporogonium. Coll. Dec. 29. $\times 55$.

Fig. 50. Median longitudinal section through sporogonium. Coll. Feb. 7. $\times 55$.

Fig. 51. Median longitudinal section through capsule. Coll. Mar. 13. $\times 55$.

12. The cells of the venter undergo many divisions and develop a protective covering called the calyptra.

13. By the middle of August a differentiation of cells is seen in the larger end of the young embryo. The inner ones are the archesporial cells and the outer ones will form the capsule wall.

14. The calyptra which has kept pace with the growth of the embryo now ceases development.

15. About August 15, the cells in the archesporial region differentiate into spore mother cells and elater-forming cells.

16. The three regions of the sporogonium (capsule, seta, foot) begin to be evident.

17. Development goes on with great rapidity until by the last of August the slightly lobed spore mother cells and nucleate elaters are to be seen occupying the space within the capsule.

18. The sporogonium is now (Aug. 28) fully formed with its globular capsule, short seta, and pointed, conical foot.

19. The wall of the capsule consists generally of two layers of cells, except in the region of the base where there are usually one or two more layers.

20. Early in September the spore mother cells all become lobed.

21. Throughout September and October the spore mother cells remain in the lobed condition and not until October do the spiral thickenings appear on the walls of the elaters.

22. By the middle of November the lobed spore mother cells have divided to form the oval spores.

23. By the last of November the first stages of germination have taken place, each spore being divided into a several-celled body.

24. No further change takes place in the spores until they are shed in April.

25. The abundance or lack of moisture has a marked influence on the development of the plants. Those growing in moist situations are more advanced on a given date than those of a drier location.

26. Plants in a very moist habitat are very apt to be sterile.

27. Those most thoroughly fruited are found on drier soil.

ADDITIONS TO THE LICHEN FLORA OF SOUTHERN CALIFORNIA. No. 6.

By H. E. HASSE, M. D.

Heppia Zahlbruckneri spec. nov.

Thallus of short, erect, terete to subterete lobules, 1 to 2 mm thick and 3 to 3.5 mm high, aggregated into groups and loosely attached to the substrate by medullary hyphae; the apices are clavate to bulbous, often spreading and assuming a flattened top; the color is olive-green and darkening. The pseudoparenchymatous cortex, containing the gonidial layer, is 40 μ thick, the pale green *Scytonema* gonidia are

6 μ to 12 μ in diam.; the medullary layer is composed of hyphae loosely interwoven, especially at the axis, and 2 μ to 3 μ thick. Apothecia, from 1 to 8 in a lobule head, are immersed, marked by a punctiform perforation of the cortex, sometimes slightly dilated to not exceeding 0.25 mm in width and depressed; disk dull brown; the flesh-colored, flattened-globular hymenium is beneath the gonidial layer. Thecium 140 μ high, colorless; paraphyses loose, coherent, slender; hypothecium colorless or of a pallid yellowish tint; asci quite numerous, upper part slightly attenuated, the membrane about 3 μ thick throughout, 112 μ long, 28 μ to 32 μ thick, the immature asci are shorter with solid thickened tops. Spores globular, 4, 5 μ to 7 μ in diameter (the liberated spores giving the larger measurement), 24 to 32 being contained in the ascus; hymenial gelatine with iodine a pale indigo blue, changing to sordid pale greenish. KHO gives a bronze red color to the gonidial layer; spermatia not seen. The species differs from others with similar spore measurements in the shape of the thalline lobules.

On quartz in Rubio Cañon, San Gabriel Range, near Pasadena, the type locality. Collected by Mr. C. C. Kingman. The same species has since been found near Riverside by Mr. F. M. Reed.

I take pleasure in naming this latest addition to the West-American *Heppiae* for Dr. A. Zahlbruckner.

Type deposited with Dr. A. Zahlbruckner and type duplicate in herb. Hasse.

***Bacidia Kingmani* spec. nov.**

Thallus poorly represented by small, congregated or scattered, sordid light olive-green, imbricated squamules, or evanescent, these when present about 0.5 mm wide, flat or conchiform; hypothallus indistinct. Apothecia sessile or substipitate, 2 to 3.5 mm wide, disk dull black, flat to convex, often with a faint grayish bloom, the persistent proper margin turgid, gray pruinose, generally strongly crenate-sinuose. Epithecium subcontinuous, bluish-black; thecium colorless, 88 μ high; paraphyses coarse, scarcely thickened above and with light brown tips; hypothecium dark brown, thicker than the thecium; asci narrowly clavate, not reaching to the epithecium and 8 μ to 10 μ thick; spores colorless, blunt fusiform, 4-to 5-locular, 14 μ to 20 μ long, 3.5 μ to 4 μ thick, often slightly curved, the septa indistinct; hymenial gelatine with iodine dark blue.

On quartzose rock in the San Gabriel Range along the "New Trail" to Mt. Wilson, collected by Mr. C. C. Kingman.

The following species have been collected by Dr. J. N. Rose in Lower California:—

Lecanora atra (Huds.) Ach. On conglomerate, East Benito Island, March 9th, 1911. (Rose 925)

Caloplaca murorum (Hoffm.) Th. Fr., East and San West Benito Island (Rose 86)

On the same piece of rock occur minute apothecia of *Blastenia ferruginea festiva* (Nyl.)?, the thallus absent.

Caloplaca Rosei spec. nov.

Thallus crustaceous, adnate, sordid, pale yellowish, minutely areolate, surrounded by a closely adnate, delicately linear-laced to almost smooth, fan shaped spreading, pale yellow hypothallus. Thallus with KHO crimson; hypothallus with KHO pale orange, neither stained with Ca (ClO)₂; apothecia sessile, 0.5 to 1 mm wide, the flat to slightly convex disk vittelline yellow with an entire margin of a somewhat paler color. Epithecium granulose, rich yellow; thecium colorless, 68 μ to 72 μ high; paraphyses loosely coherent, furcate and septate beneath the subglobular pale yellow heads; hypothecium colorless; asci 8-spored, clavate, 50 μ to 60 μ long, 12 μ to 14 μ thick; spores oblong-ellipsoid, some polari-ocular with connecting tube, others having the cells approximate, 12 μ to 16 μ long, 4 μ to 8 μ thick; hymenial gelatine with iodine blue; epithecium with KHO carmine, the other hymenial structures a light pink, or mostly, without reaction. The distinctive hypothallus and chemical reactions have induced the recognition of this species as new, and it is named for its collector, Dr. J. N. Rose of the Smithsonian Institution.

On quartzose rock, San Roque, Lower California, March 15th, 1911, (Rose 928)

Associated with it are *Buellia stellulata* (Tayl.) Mudd. (Rose 927), and a sterile *Xanthoria*, probably *X. lychnea pigmaea* (Bor.) Th. Fr.

Dirina Catalinariae spec. nov.

Thallus determinate, thick, areolate-rimose, white, reaction with KHO yellowish, with Ca (ClO)₂ pinkish-red, the algae are *Chroolepus*. Apothecia 1.5 to 2 mm wide, substipitate upon a short thick thalline elevation; disk round or slightly angular, dark but covered by a dense white pruina, proper margin thin, hidden by a turgid thalline one, which later becomes thinner. Epithecium granulose, sordid, pallid yellowish; thecium colorless, 120 μ to 140 μ high; paraphyses loosely coherent, with fine granular interior, not well defined; hypothecium thick, dark brown, on section appearing black to the unaided eye, its upper surface concave, the lower projecting downward with an acuminate central point into the medulla of the stipular elevation; asci clavate, 72 μ long, 16 μ thick, the membrane thick throughout; spores fusiform, their ends rounded, straight or lightly curved, epispore distinct, 24 μ to 30 μ long, 6 μ to 8 μ thick; hymenial gelatine gradually vinous red with Iod., KHO—; the asci are numerous, but spores are rare and but few are seen with spores. In place of apothecia many of the substipular elevations are capped by isidiose heads. Spermatia were not found.

Type locality, Catalina Island on beach boulders near Avalon, May, 1911. Type in herb. Hasse.

An interesting addition to the two corticular species of Southern California and the one saxicolous species of the northern coast.

FUNGI ON MOSSES

ELIZABETH G. BRITTON.

Cladosporium epibryum Cooke & Masee was referred to in the Bryologist for May 1911 and originally described without indication of hosts. As they were all sent to Dr. Masee, I wrote to inquire about them and received the following list of mosses as host species:

1. *Ulota phyllantha* Brid.—Jaquina Bay, Ore.—T. Howell.
2. *Grimmia ovata* W. & M.—Canada.—J. Macoun, No. 84.
3. *Grimmia Doniana* Sm.—Spokane Falls, Wash.—J. B. Leiberg, No. 110.

Encalypta rhabdocarpa Schwgr. —Lake Pend d'Oreille, Ida.—J. B. Leiberg, 153 pp.

5. *Bartramia pomiformis* Hedw.—Lake Pend d'Oreille.—J. B. Leiberg, 153 pp.

6. *Hypnum megaptilum* Sull.—Lake Pend d'Oreille.—J. B. Leiberg.

7. *Fabronia andina* Mitt.—Ingenio del Oro, Bolivia.—H. H. Rusby.

8. *Bartramia Potosica* Mont.—Sorata, Bolivia.—H. H. Rusby.

These types are at Kew and duplicates of them exist at the New York Botanical Gardens. The fungus occurs as black septate filaments protruding from the walls of old capsules, particularly those that have wintered over, usually species of genera that hold their capsules a long time. In the case of *Ulota phyllantha*, they occurred around the mouth of the capsule, and the teeth were so much distorted and undeveloped that it was difficult to describe the peristome, on these, the first record for this moss to be found fruiting.

NOTES ON SOME OF THE PRINCIPAL MOSSES OF THE COAST REGION OF BRITISH COLUMBIA.

[Read at Sullivant Moss Society Meeting, Minneapolis, Dec. 28, 1910]

ALBERT J. HILL

Though for some years cultivating and greatly enjoying an amateur acquaintance with the moss flora of this Pacific Slope, I have always felt great hesitation in committing my scant knowledge to writing, conscious that I possess no critical acquaintance with the subject.

What little has been learned of the several genera and species that carpet our great evergreen forests and festoon their giant boles for a hundred feet skyward, has come of actual contact with Nature only, except as assisted by friends of the Sullivant Moss Society to whom I am under lasting obligations for frequent and valued favors.

The climate of British Columbia, at least of that portion of it occupying the Western flanks of the Cascade Range of mountains and including the Islands of the Gulf of Georgia, is of a peculiarly mild

and humid character and especially adapted to the production of a profuse cryptogamic flora which everywhere abounds, from the tiny mosses that clothe every damp clay bank in velvet of richest browns and greens and that require a strong magnifier to resolve them into beautiful perfect fruited plants, up through cryptogams of larger growth, lichens, hepatics and ferns to the great bracken, *Pteris aquilina*, that in favorable situations reaches a height of fifteen feet with a rachis like a giant's staff. Such is our forest undergrowth, of perennial green, "A thing of beauty and a joy forever."

Profusion and paucity, however, seem to follow each other in cycles, the causes of which are not yet made out, and the prolific years of 1903-4 have been succeeded by a strange suppression of the moss-flora, so that in 1905 and subsequently very little could be done in collecting, but there are indications at last, of a return to fruitful seasons and what may be considered normal conditions, which may continue for years to come.

As to the relative abundance of the genera, perhaps first place should be accorded to the Mniums in their many varieties, with *M. insigne* leading, and covering large tracts with its dark green foliage and abundant fruit. Though taking kindly to either humus or rotten wood the former seems to be its natural habitat, and so dense, at times, is its growth and fruitage that one season fifty perfect plants might be taken at a single grasp. These were nearly all *insigne*, but strangely enough while the succeeding spring disclosed the same areas as densely populated with Mniums as before, *insigne* was noticeable only by its absence, and *venustum*, *glabrescens* and other lesser varieties monopolized the ground. This was sufficiently surprising and presents a problem yet to be solved. Was it a natural rotation or what?

M. Menziesi is somewhat arboreal in habit and affects the living trunks of *Acer macrophyllum*, but frequently adapts itself to rich and damp humus along brooksides; its likeness to *Climacium* in such situations is apt to cause it to be overlooked unless in fruit, when its identity is unmistakable.

The Hylocomiums undoubtedly rank next in profusion, and *H. splendens*, *loreum triquetrum* representing a large percentage of the entire moss flora of the Coast. The first is especially luxuriant and is without a peer and our finest bryophyte, but it is a rare and shy fruiter. In habitat it occupies indiscriminately the ground in shady forests or rotten logs and stumps, but never living trees or wet situations. *H. loreum* is found exclusively on decayed wood, is a profuse fruiter and with its abundant red capsules is a strikingly beautiful plant. *H. triquetrum* is also an abundant variety, covering large tracts of damp soil or wet rock with its pale green foliage, and climbing over prostrate timber and upturned roots of trees. It fruits rarely but occasionally produces abundant capsules.

Neckera Menziesii, *N. Douglasii* and *N. oligocarpa* are arboreal in habitat and confined almost exclusively to living trunks of *Acer macrophyllum* and *A. circinatum* and fruit abundantly.

Climacium dendroides is locally abundant, preferring low and moist lands subject to inundation. It fruits copiously late in the summer.

Hypnum subimponens, *H. sequoietae*, and *Crista-castrensis* are common, confined to fallen timber and moist situations, climbing on stumps and tree trunks and fruiting abundantly.

Alsia abietina occurs on Mayne Island, on large detached boulders along the Point Comfort Road, and also at Langley on the Fraser River on the bases of Cottonwood trees, in both localities fruiting well.

Pogonatum contortum is found in abundance along the shady ditches of the Blue Mountain Road in damp localities, also along the Pipeline road to Lake Coquitlam, fruiting copiously in summer and autumn.

Fontinalis Kindbergii R. & C. is not uncommon in standing water in shallow forest pools but has not been found in fruit. *F. Dalecarlica* also trailing from old posts at Langley subject to inundation but uniformly sterile.

Philonotis fontana is abundant in sluggish streams and ditches at New Westminster and at Sicamous and elsewhere, associated with *Camptothecium nitens* and in profuse fruit.

Polytrichum commune occupies waste and sterile soil and is too abundant everywhere.

Orthotrichum cylindrocarpum is abundant locally on old trees in neglected orchards, and fruiting copiously.

Dicranum scoparium and *D. Bonjeani* are found in dense tufts on rotting logs and decaying trunks of standing timber, fruiting copiously.

Camptothecium lutescens occurs at Midway on the Province boundary and not infrequently farther North; a beautiful and graceful plant and fruiting well.

Plagiothecium undulatum is a striking and handsome moss creeping over rotten logs, its only habitat, easily recognized by its long silvery fronds; fruiting freely in fall and winter.

Rhyncostegium recurvans is common on rotting prostrate timber.

Antitrichia Californica is abundant on the trunks of living cottonwood trees encircling them in dense mats to far above easy reach. A beautiful moss and abounding in fruit in autumn.

Orthotrichum Lyellii occurs at Whonnock on the Fraser, fruits sparingly.

Brachythecium rivulare is not rare from the Forty-ninth parallel to Atlin and farther north, in quiet water and roadside ditches.

Racomitrium canescens is an abundant and interesting variety, clothing rocky ledges and gravelly stream beds with its curious hoariness; quite indifferent to flood or drought, from either of which it emerges on the return of improved conditions bright and cheery as ever.

Isoethecium myosuroides, trails from the branches of moribund evergreens, its long pendulous tresses often in full fruit in early Spring.

Eurhynchium Oreganum occurs on Pender Island, Gulf of Georgia and elsewhere, choosing rotting stumps as a habitat and fruiting well.

Funaria hygrometrica is a mysterious apparition, offspring of fire and not of water, springing up in crowded ranks wherever the soil has been thoroughly calcined by recent fire. A conflagration that has burned a forest to the roots and left no remnant but red ashes and desolation is sure to call up ten millions on ten millions of the tiny things so closely packed that no insect can penetrate the thicket. Always in some stage of dense fruit.

Dicranella Schreberi, rare, at Sicamous.

Dicranoweisia cirrhata in small dense tufts on scorched and decaying timber in densest fruit in early spring.

Aulacomnium androgynum, not rare on rotten wood and bearing its characteristic sporophytes and gemmae in abundance.

*Sphagnum*s of numerous species and varieties occur wherever suitable conditions prevail but fruit from any of them is exceedingly rare, although patient search in high boots is sometimes rewarded with scant returns.

It is generally supposed that mosses avoid salt water, but at Miner's Bay, Gulf of Georgia, there occurs a beautiful variety of unknown name which thrives on the rocks lapped by the ocean water at high tide. It has not been noticed in fruit but appears to be a true terrestrial moss and a very beautiful one.

Isoethecium Brewerianum is abundant on the bases of Douglas Firs on Mayne Island and elsewhere, fruiting freely in autumn.

Pogonatum capillare, on wet clay banks at Lake Coquitlan in fine fruit.

Dicranum fuscescens, on decaying conifers very common and always in some stage of fruit.

Claopodium crispifolium is abundant everywhere on rotting timber in damp and shady woods.

This list of British Columbia Mosses represents, without any attempt at scientific arrangement, a small part only of the contents of the writer's covers.

New Westminster, British Columbia.

REVIEW.—GENERA HEPATICARUM

Clé Synoptique avec Figures de tous les Genres connus d'Hépatiques.

L'Abbé Charles Lacouture, Professor of Natural History at the Collège Saint-Clement of Metz, finished the above work before his death. It was his wish to prepare a practical, non-technical key to

all the known genera of hepatics. It follows the same plan as his Analytical Key to the forty-three Subgenera of the old Genus *Lejeunea*, published in 1908, in the *Revue Bryologique*.

The fact that exotic collections contain so many sterile specimens with small hope of their ever again being found led the author to use vegetative characteristics so far as possible in the key, which by synoptical figures leads to the determination of the genera. The increasingly large number of known species obliges the specialist to give a more and more careful description of the differences in structure of the plants, and as few students have access to the literature concerning collections from various regions of the world or to the expensive works treating the subject in full, there seemed to be a distinct demand for such a work.

Part First of the Atlas separates the hepatics of the world into tribes, shown in three tables. First Table shows the tribes having incubus leaves. Second Table, those having non-incubus or succubus leaves. Third Table, those having thallose forms. The second part of the Atlas leads to the determination of the genera of each tribe in sixteen tables accompanied by one hundred and forty-two figures. Each table, in a foot-note, gives generic and specific names of those represented. Each genus is shown by a figure of the most typical species, excepting in a few cases where there are two species given as more comprehensive. There is also an alphabetical index to genera with references to figures and tables.

In a note are added five new monotypic genera. A second note added by the editors, after the author's death, gives a few corrections and reductions.

This concise little book of forty-six pages with clearly drawn illustrations, the figures showing mostly fruiting plants, can be commended as a handy work of reference. It stands quite alone, excepting the large work, illustrated, by Professor Schiffner in the *Natürlichen Pflanzenfamilien* of Engler and Prantl, or, *Species Hepaticarum* which is being published by Franz Stephani; this, however, is not illustrated. There are faults, arbitrary ones, such as confining all the leafy forms into two groups with incubus and succubus leaves, etc. The nomenclature follows the European plan, but will not prove much of a stumbling block, nor, with the figures, should the foreign text.

The figures are drawn from nature by the author or reproduced from illustrations published by R. Spruce, V. Schiffner and F. Stephani.

It is published by the Librairie Venot, place d'Armes, Dijon (Côte-d'Or) France, no price being given. The companion work has for title: *Hepatiques, Clé Analytique des Quarante et quelques Sous-Genres de l'ancien Lejeunea*, consisting of fourteen pages of text and plates, and can be bought of the same publisher for four francs.

Caroline Coventry Haynes.

SULLIVANT MOSS SOCIETY NOTES.

Notice—Election of Sullivant Moss Society Officers for 1912.

Members are requested to send ballots *at once* to Miss Edith A. Warner, 78 Orange Street, Brooklyn, New York, Judge of Elections. Polls close November 30th.

For President.—Dr. A. W. Evans, Sheffield Scientific School, New Haven, Conn.

For Vice-President.—Miss C. C. Haynes, Highlands, New Jersey and New York City.

For Treasurer, Mrs. Annie Morrill Smith, Brooklyn, N. Y.

For Secretary, Mrs. Eva B. Gadsby, 615 East Cheltenham Avenue, Germantown, Pa.

The eighth public meeting of the Sullivant Moss Society in affiliation with the American Association for the Advancement of Science, will be held in Washington, D. C., during the week December 25th-30th. The exact date, place of meeting and last details will be sent out on post cards to members as soon as possible after the next meeting of the Executive Committee. All members are urged to be present and provide material for the program and exhibition purposes. For further particulars address Mrs. Smith, 78 Orange Street, Brooklyn, New York.

EXCHANGE DEPARTMENT.

(To Society members only. Be sure to send a stamped, self-addressed envelope.)

Prof. A. F. K. Krout, Ph. D., Glenolden, Pa.—*Ptilidium pulcherrimum* (Web) Hampe. Collected at Springfield, Delaware Co., Pa., on syenite rock, also *Bryum intermedium* Brid.

Mr. C. C. Kingman, 11 Lowell Street, Reading, Mass.—Offers *Grimmia Californica* Sulliv. and *Orthotrichum Bolanderi* Sulliv. Both collected in Southern California.

Prof. H. Dupret, Seminary of Philosophy, Montreal, Canada.—Offers *Lophozia Baueriana* Schiffn. Collected at Regaud, P. Q., Canada. *Cephalozia curvifolia* (Dicks) Dum. Collected at Oka, P. Q., Canada.

George M. Pendleton, Siskiyou Co., Sisson, Cal.—*Chiloscyphus polyanthus* (L.) Corda. var. *rivularis* Nees. Collected at Sisson, Cal., Mt. Shasta, alt. 4200 ft. *Riccardia pinguis*, (L.) S. F. Gray. Collected at Sisson, Cal., alt. 3000 ft.

A. S. Foster, Gate, Wash.—*Alsia abietina* (Hook.) Sulliv., *Blindia acuta* (Huds.) B. & S. *Gymnostomum rupestre* Schleich. All from the Northwest Coast.

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For Sale.

The very valuable moss herbarium of Dr. Harald Lindberg is For Sale. It contains duplicates of nearly all the mosses in the collection of the late S. O. Lindberg, his father. For particulars write

DR. HARALD LINDBERG,
Helsingfors, Finland.

Winter-Course Instruction in Floriculture at Cornell.

The Department of Horticulture, of the New York State College of Agriculture at Cornell, is offering a special winter-course in floriculture and allied subjects. This is coordinate with a course in vegetable culture and in fruit growing which has been given for the past four or five years. It will afford men and women interested in the growing of flowers under glass and in the field as amateurs or commercialists an excellent opportunity to gain the important and fundamental principles underlying the industry. This winter-course in floriculture will consist of lectures and practical work in the greenhouse in about equal parts, supplemented by collateral reading and special investigation. It will open December 1, 1911, and will continue until March 1. Correspondence should be directed to the Department of Horticulture, New York State College of Agriculture, Ithaca, N. Y.

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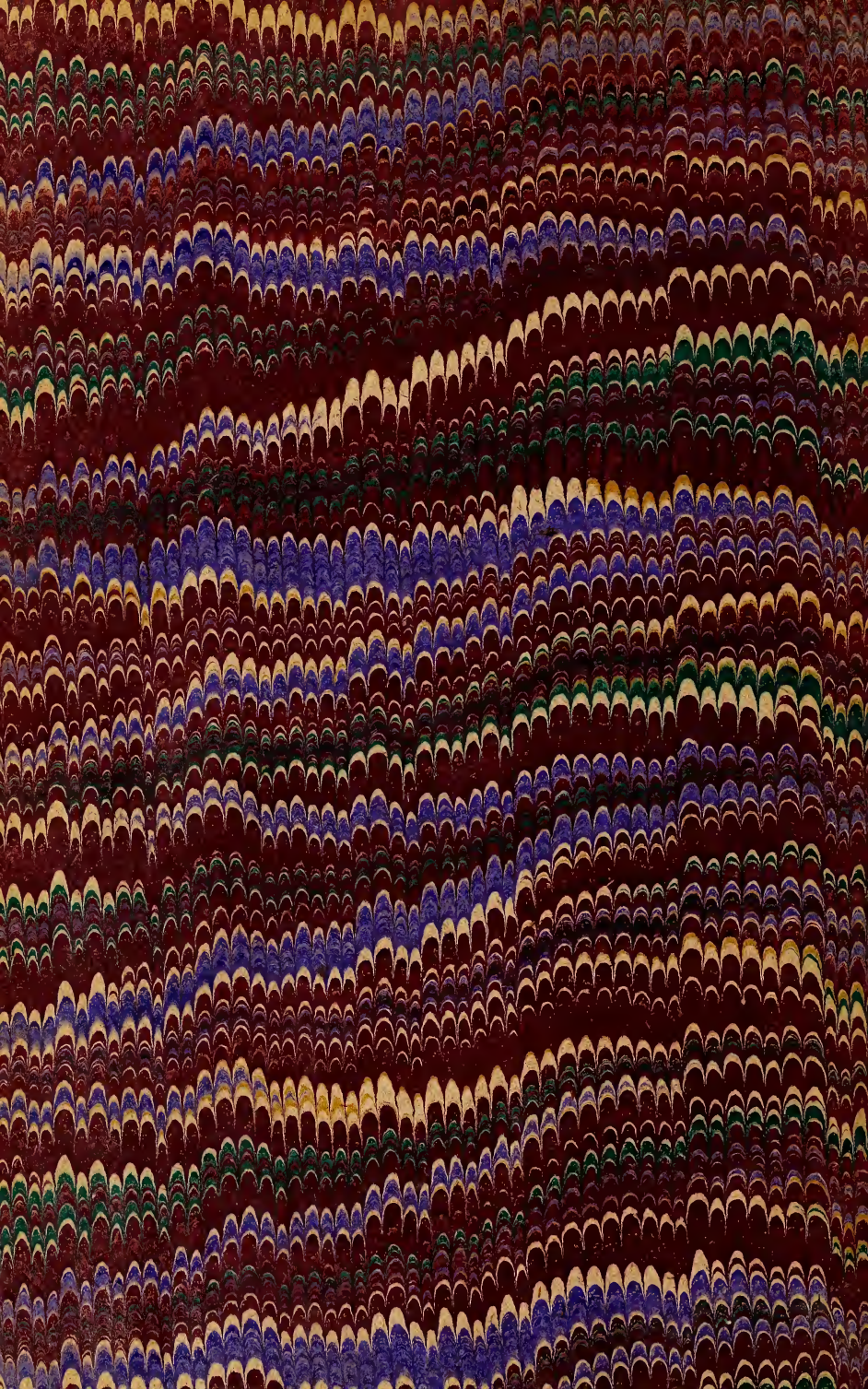
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